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MEMOIRS

OF THE

AMERICAN ACADEMY.

I.

CHLORIS BOREALI-AMERICANA: *Illustrations of New, Rare, or otherwise Interesting North American Plants, selected chiefly from those recently brought into Cultivation at the Botanic Garden of Harvard University, Cambridge.*

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DECADE I.

(*Communicated to the Academy, January 27th,* 1846.)

THIS memoir is designed to contribute in some degree to the advancement of North American botany, by illustrating several new or scarcely known plants, especially those of which the floral structure, natural affinities, or generic characters have hitherto been imperfectly made out, or in some respects misapprehended. The subjects chosen for illustration in this first decade are none of them absolutely new to botanists. Two of them, indeed, have been already figured, but without the analyses and details requisite to elucidate their real structure, and settle the questions upon which their ordinal or generic collocation depends. The others, with one exception, belong to genera or species which have not yet been published in any systematic work, at least under their proper names, or which, like the rare Schweinitzia, have hitherto been very imperfectly characterized. Certain plants, which have been first introduced into cultivation at the Botanic Garden under my charge, and which are of special horticultural rather than of strict botanical interest, may also be deemed worthy of occasional illustration. Of this kind is the Gaillardia, represented in Tab. IV.

It will be noticed that the plant which forms the subject of the first illustration is given under a name different from that which, if my conclusions are correctly drawn, it must hereafter bear. This is explained by the fact, that the plate was engraved and the impressions taken long before I was able to make the comparisons which rendered the change of name inevitable.

OAKESIA CONRADII, *Tuckerm.*

TAB. I.

OAKESIA, *Tuckerman in Lond. Journ. Bot.*, 1. *p.* 446.

Tuckermania, *Klotzsch.*

Flores dioici seu polygami, capitati, singuli bracteolis nempe squamis 5–6 membranaceo-scariosis concavis bi–trifariam imbricatis suffulti. Perigonium proprium nullum. *Masc.* Stamina 3, rarius 4: filamenta filiformia: antheræ versatiles, subgloboso-didymæ, biloculares, loculis per rimam longitudinaliter dehiscentibus. Pistilli rudimentum sæpissime nullum. *Fœm.* Ovarium obovoideum, triloculare, raro quinque–sexloculare, loculis uniovulatis: ovulum anatropum ex angulo interno erectum: stylus tenuis, brevi-exsertus, apice trifidus, nunc quadri–quinquefidus; laciniis subulatis, patentibus, sæpius uni–bidentatis, intus stigmatosis. Discus hypogynus (ut in ordine!) plane nullus. *Hermaph.* Pistillum fl. fœminei. Stamina 3, omnia antherifera, vel 1–2 ad mera vestigia reducta: antheræ sæpius dimidiatim uniloculares. Drupa parva, subglobosa, sicca (epicarpio pertenui), tripyrena, nunc quadri–quinquepyrena; pyrenis cartilagineis, semine erecto impletis. Embryo gracilis, in axi albuminis carnosi orthotropus, eodem brevior: radicula infera: cotyledonibus brevissimis.

Fruticulus ericoideus depressus, ramosissimus, diffusus; foliis ter–quaternatim verticillatis sparsisve, confertis, patentibus, linearibus, sub lente hispidulo-scabris, convexo-planis, subtus sulco profunde exaratis. Flores in capitulis terminalibus multibracteatis digesti, singuli in axilla bracteæ aridæ squamæformis arcte sessiles. Squamæ fulvæ: stamina longe exserta stylique rubiginosi.

O. Conradii, *Tuckerman, l. c.; Hook. Ic. Pl.* 6. *t.* 531.

Empetrum Conradii, *Torr. in Ann. Lyc. Nat. Hist. New York*, 4. *p.* 83 (1837); *Bigel. Fl Bost.*, *ed.* 3. *p.* 393.
Tuckermania Conradii, *Klotzsch in Erichs. Archiv.*, *Apr.* 1842, *p.* 248.
Corema Conradii, *Torr. & Gray*, *ined.*

Hab. In arenosis "Pine barrens" dictis, Novæ Cæsareæ, ubi primum detexit beat. *S. W. Conrad*, posthac legerunt *Rafinesque*, *Torrey*, et *Knieskern*. Circa Plymouth Massachusettensium, *Oakes*, *Tuckerman*, *Russell*, etc. In rupestribus aridis, prope Bath, Mainensium, *Gambell*. Newfoundland, *Cormack* (ex *herb. Lamb.* fide cel. *Tuckerman*). Primo vere floret.

The figure and analyses here given were principally made, in the spring and summer of the year 1845, from specimens of the living plant obligingly communicated to the Botanic Garden of Harvard University, by Gustavus Gilbert, Esq., of Plymouth.

This low and spreading shrub, with its evergreen heath-like foliage, blossoms at the same time as the Epigæa, in early spring. The staminate plants then present a very pretty appearance, each branch being crowned with a capitate cluster, of which the slender

tufted stamens, tipped with brown-purple anthers, are principally conspicuous, and are persistent for a considerable period. It then has the aspect of some Diosma, rather than of a Heath or a Crowberry. The fertile flowers are by no means showy, except when clusters are found which exhibit stamens as well as pistils, which is not unusual. In this case, however, few of the flowers are really perfect. For, when the pistil is well formed, the stamens are commonly more or less reduced, either by the suppression, partially or completely, of one cell of the anther, or by the reduction of one or more of the filaments to mere vestiges. Three cases of this sort, selected from a full series of such analyses, are represented in Figures 6, 7, and 8. The fertilized flowers are succeeded in the course of the summer by clusters of small and juiceless drupes, which, by the proliferous growth of the shoots of the season, now usually appear to be lateral; as is shown in the right-hand figure of the accompanying plate. The full generic character already given, the explanation of the plate, which comprises the more requisite analyses, very carefully drawn by Mr. Sprague, together with the ensuing historical and critical observations, render a further detailed description of the plant unnecessary.

Dr. Torrey, in the article above cited in which this plant was first made known, has recorded the history of its discovery, by the late Professor Solomon W. Conrad, near Pemberton Mills, about ten miles from Burlington, New Jersey, and subsequently by the late Mr. Rafinesque at Cedar Bridge, in Monmouth county of the same State; from which locality Dr. Torrey himself obtained a supply of living specimens. It has since been detected by Dr. Knieskern at other localities in the "Pine barrens" of New Jersey. Recognizing in this plant an interesting accession to the small family *Empetraceæ*, Dr. Torrey referred it, though with some hesitation, to the genus Empetrum itself. His faithful description, although drawn from less perfect specimens than we now possess, leaves little to be added, except the account of the fruit, which was then unknown. He did not fail to notice its agreement in habit and some points of structure with the Empetrum album, *Linn.*, the Corema of Don.* Had the latter plant been known to him otherwise than by an imperfect and faulty description, the agreement would certainly have been more insisted on.

In the autumn of 1840, Mr. W. Gambell gave me good specimens of this plant, which he had gathered the preceding spring on the rocky banks of the Kennebec, in the neighbourhood of Bath, Maine. For the discovery of this station, I believe we are indebted, not to Mr. Nuttall directly, as has been stated, † but to his enterprising young friend and pupil just named. Previously to this, however, namely, in 1838 and 1839, the Plymouth locality had been brought to notice by Mr. Russell, Mr. Gilbert, Mr. Tuckerman, who identified it with the Empetrum Conradii of Torrey, and Mr. Oakes, by whom the ripe fruit was first detected.

Specimens having been communicated by Mr. Tuckerman to Dr. Klotzsch of Berlin, this botanist was led to study the plant, and to propose its establishment as a new genus, which he very appropriately dedicated to Mr. Tuckerman. In the detailed generic character of *Tuckermania* by Klotzsch, the nature of the fruit was first made known. ‡ The seed, however, was not examined; its structure, and that of the embryo, have been left for me to supply. The points in which the generic characters by Klotzsch differ from the detailed description by Torrey are few and slight, and, I may add, not invariably correct. The rank of the scarious envelopes of the flower, called by Torrey, with purposed ambiguity, the "scales of the perianth," and by Klotzsch distinguished into a "calyx triphyllus," and a "corolla diphylla," is of course a matter of opinion. But they cannot, except in an arbitrary manner, be divided into an outer and inner series; they are imbricated one over another, in the manner of the scales of a winter bud, which purpose they subserve; they vary in number from five to six or more, and the only difference is, that the inner are successively thinner and more hyaline, as in an ordinary bud. These have not the petaloid appearance or texture of the "petals" of Empetrum, which form apparently a true perigonium. It were perhaps best to consider the whole of them as equivalent to the "six imbricated scaly bracts" of Empetrum. However that may be, they are absolutely the same as the "calyx 3-phyllus; petala *3*" of Corema, *Don*, that is, when actually six in number, which is not uncommonly the case. Klotzsch's character, "corolla (fœm.) diphylla," should therefore be *corolla 2–3-phylla*, when it would agree with Dr. Torrey's description, though in other terms. In describing the corolla of the sterile flowers, Klotzsch has unfortunately mistaken an occasional and plainly accidental deviation for the regular structure.* Although these inner scales do sometimes grow together more or less, in the manner exhibited at Fig. 4, yet this union is quite casual and variable, and obviously of no moment, except as it tends to show that these organs are not really petals. The stamens, though generally three, are often four, as Dr. Torrey had stated. The ovary is merely said to be three-celled by Klotzsch; and by Torrey, with closer correctness, 3–4-celled. It is sometimes, though rarely, five-celled, the divisions of the style varying in like manner; and, I may add, that these are quite irregular, and often (as in Corema) a little incised or two-toothed. Dr. Klotzsch's summary of the points in which his genus is held to differ from its nearest allies will be noticed presently.

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* *Annals of the Lyceum of Nat. Hist. of New York, l. c.*, p. 86.

† *London Journal of Botany*, Vol. I., p. 445.

‡ "Fructus parvus, drupaceous, siccus, depresso-globosus, tri- abortu dipyrenus, pyrenis cartilagineis monospermis. Semen ?" *Klotzsch, in Erichs. Archiv., l. c.*, p. 250.

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* "Corolla (fl. masc.) tenuissime membranacea, cyathiformis, apice truncata et minutissime denticulata, longitudinaliter fissa, deinde diphylla." *Klotzsch, l. c.*

On his return from Germany to England, in the summer of 1842, Mr. Tuckerman, learning that the name which Dr. Klotzsch gave to this genus had been already applied to a different plant by Mr. Nuttall,* embraced the opportunity that now offered to dedicate such an interesting New England plant to William Oakes, Esq.; a botanist whose name is "inseparably connected with the New England Flora" which he has done, and is doing, so much to illustrate. Mr. Tuckerman's article was published in the first volume of Hooker's *London Journal of Botany*, in the autumn of 1842. He was enabled to extend our knowledge of the geographical range of the plant, by detecting a specimen in the Lambertian herbarium, gathered in Newfoundland † by Mr. Cormack, which the late Professor Don had misnamed "Ceratiola ericoides." He also gave a good history of our knowledge of the plant up to that time; and reproduced Klotzsch's generic character, merely changing the name to *Oakesia*. This character was again repeated, soon after, by Hooker, accompanied by a figure of the plant, with some good analyses of the flowers, which, he remarks, do not so well accord with Dr. Klotzsch's description as could be wished.* Hooker has well represented the perianth or scales of the flower. He also detected an abortive pistil in one of the sterile flowers. The fruit was unknown to him, and, indeed, that possessed by Mr. Tuckerman and Dr. Klotzsch was said to be abortive.

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* Tuckermania, *Nutt. in Trans. Amer. Phil. Soc.; Torr. and Gr. Fl. N. Amer.* 2, p. 355; a showy Californian Composita. Specimens likewise exist in the late Dr. Coulter's Californian collection.

† Dr. Torrey (in *Ann. Lyc., l. c.*), having noticed that Pylaie had included Empetrum rubrum in the enumeration of his Newfoundland collection, inquires whether this may not be his Empetrum Conradii. Now that Newfoundland specimens of the latter plant have been brought to light by Mr. Tuckerman, it becomes interesting to answer this inquiry. An examination of Pylaie's herbarium enables me to state that his "Empetrum rubrum ? L." is not E. Conradii, but is very like the Magellanic species.

Good fruit, however, was gathered by Mr. Oakes, and communicated both to Dr. Torrey and myself; it has also ripened in the Botanic Garden at Cambridge. The mature drupes are represented of the natural size in the right-hand figure of the accompanying plate; they are no larger than a pin's head, and have, even when fresh, only a thin coating of juiceless flesh. In the dry state, the cartilaginous pyrenæ may be made to separate by considerable pressure, when they incline to open by the ventral suture; but I believe the fruit is never spontaneously dehiscent. The erect seed, which fills the cell of each pyrena, has a taper embryo in the axis of fleshy albumen, of two thirds its length, the radicle being, of course, inferior, and the cotyledons very short.

In order rightly to estimate the value of the characters assigned to the genus Oakesia, it will be necessary to correct some errors which prevail respecting Empetrum itself. The late Professor Don, in drawing out the characters of the order Empetreæ, stated that the ovary rests on a fleshy disk;† which character is more strongly presented by Lindley, namely, "ovary seated in a fleshy disk,"* and has been copied by Endlicher into the description of each genus in the form of "Ovarium disco carnoso insidens."† But I can find *no disk whatever*, either in Empetrum nigrum or E. rubrum, or indeed in any other plant of the family. Another mistake, relating to the insertion of the seed and the pericarpic direction of the embryo, appears also to have originated with Professor Don. He characterized the seed in the whole order as erect or ascending (at least by implication), and the radicle of the embryo as inferior,—characters which have been adopted without scrutiny by succeeding systematic writers, but which, though true as respects Corema, Ceratiola, and Oakesia, are not applicable to Empetrum itself. The only correct representation of the insertion of the seed in Empetrum is that in the well known *Genera Plantarum Floræ Germaniæ* of the younger Nees von Esenbeck.‡ The seed in E. nigrum (as also in E. rubrum) is, in fact, suspended from the upper inner angle of the bony cell, just as the artist has represented in Fig. 19 of the plate in the work referred to. But in the longitudinal section of the seed, at Fig. 20, the artist has depicted the embryo with the radicle inferior, and the cotyledons next the hilum; or, in other words (the seed being anatropous), has made the *cotyledons*, instead of the radicle, *point to the micropyle!* which is of course an impossibility. Endlicher has cited the plate without correcting the incongruity, but, probably supposing that the mistake regarded the seed rather than the embryo, has rejected what was really correct in the figure, and adopted the error. But any botanist may readily satisfy himself, by examination, that the radicle in Empetrum lies next the hilum, and points to the apex of the fruit;* thus invalidating the character on which Don and Lindley rely for distinguishing the family from Euphorbiaceæ. Since the other genera of this truly natural group differ from Empetrum in really possessing an erect seed and an inferior radicle, I may remark, in passing, that we have here a case in point against the adoption of a rule recently laid down by M. Ad. Brongniart, namely, that the direction of the radicle is of much higher importance considered with respect to the pericarp than with respect to the hilum.†

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* *Icones Plantarum*, Vol. VI. (or II. new series), t. 531 (1843).

† "Ovarium . . . . . disco carnoso impositum." *Don, in Edinb. New Phil. Journal*, Vol. II., p. 62.

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* *Nat. System*, ed. 2, p. 117, and *Vegetable Kingdom*, p. 285.

† *Genera Plantarum*, p. 1106.

‡ Even here the structure is misapprehended in the text; the drupe being called a berry, the pyrenæ, seeds, the hilum, an internal chalaza, &c. The correct view is suggested, however, in a parenthesis at the close.

The diagnosis of the genus Oakesia is stated by Klotzsch (I cite from the translation by Mr. Tuckerman) as follows: — "We find that *Empetrum* differs in having single axillary flowers supported by three bracts, a three-leaved corolla, a 6–9-celled ovary sunk in a fleshy disk, and a closely sessile radiately expanded 6–9-cleft stigma; that *Corema*, agreeing with this plant in the habit and inflorescence, is yet distinguished from it by the want of bracts, by a three-leaved corolla, an ovary sunk in a fleshy disk, and a radiately expanded six-cleft stigma supported by a short style; and that *Cera-*

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* In no case have I found the embryo *eccentric*, as it is figured and described in the *Genera Fl. Germaniæ*, but always directly in the axis of the albumen, and with a slight curvature corresponding to that of the seed. Neither is it so long as there depicted; being scarcely more than two thirds the length of the albumen. It is in the work here referred to, that the compound pollen of Empetraceæ has alone been noticed; but it is most strikingly seen in Oakesia. It is singular, now that this group is so widely separated from Ericaceæ (to which Jussieu appended Empetrum), that it should, after all, be found to accord with the Heath tribe in this somewhat peculiar character.

† *Brongniart, Enumeration des Genres de Plantes cultiv. au Mus. Hist. Nat. Par.*, p. ix. (introduction).

tiola, approaching it in its two-leaved corolla, differs in having axillary flowers supported by four bracts, a two-leaved calyx, two stamens, a two-celled ovary sunk in a fleshy disk, and a radiately expanded six-cleft stigma, supported by a short style." *

I have already observed, that I can find no fleshy disk in Empetrum; and in the few flowers of Corema which I have been able to examine there is certainly no more trace of a disk than in Oakesia itself. There is usually a distinct though short style in Empetrum; but the scattered solitary flowers, proper petaloid perianth, 6–9-celled ovary, and, above all, the direction of the seed and embryo, which I have now pointed out, abundantly distinguish Empetrum from the plant in question. Ceratiola is distinguished by its scattered dimerous flowers and greatly developed laciniate stigmas; the latter, however, are two, deeply 2-parted, and incised, rather than a "stigma subsexfidum." But as respects Corema, I can confirm none of the distinctive marks that have been indicated. Where Dr. Klotzsch refers to the "want of bracts" in Corema, he has, I fear, misapprehended the phrase, "Calyx triphyllus membranaceus, basi nudus," of Don, who evidently refers to the want of *bracteolæ*, beyond the six which he regards as calyx and corolla.† In this respect, as well as in the texture and appearance of these envelopes, Corema and Oakesia are quite alike, except that the number in the latter is *sometimes* one fewer. The casual union of the innermost may surely be disregarded. The style and its branches are shorter in the Portuguese than in the American plant, but the difference is inconsiderable; and, instead of a "stigma sexfidum" in the former, I have only met with a style three-cleft at the apex, the lobes thus answering to the cells of the ovary, and one or two of them often more or less two-cleft at the apex. The pilosity of the receptacle of the head of flowers in Corema is simply a continuation of the pubescence of the branches, &c., in which Corema differs from Oakesia, just as Empetrum rubrum does from E. nigrum. The habit of the two plants is very similar; although Corema alba, in its erect growth and slenderer leaves, has apparently more the aspect of our Ceratiola. I have not seen the ripe fruit of Corema, but if the drupes figured by Gærtner were full grown, they are little larger than in our plant, and the pulp is sparing. A difference in the amount merely of the sarcocarp can be of no generic consequence; but beyond this I know of no tangible character to distinguish Oakesia from Corema.

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* *London Journal of Botany*, *l. c.*, p. 446.

† If, on the other hand, Dr. Klotzsch refers to proper bracts, namely, the scales of the capitulum subtending each flower, these certainly are present in Corema, as well as Oakesia, though not so conspicuous, and are described by Don and Endlicher. In Oakesia they are rounded and pointless; in Corema, acuminate.

I have to regret, therefore, that such a poorly marked genus should have been dedicated to so excellent a botanist as my valued friend, Mr. Oakes. The accompanying plate was lettered and engraved before I had made the examinations which have led to this conclusion. In this view, I have perhaps been anticipated by my distinguished associate, Professor Torrey; for among my specimens I find one ticketed by him "*Empetrum* (*Corema*) *Conradii*."

With our present knowledge, the diagnoses of the three genera of Empetraceæ must, I think, stand as follows: —

1. EMPETRUM, *Tourn.*, *Linn.* (excl. sp.)

Flores in axillis foliorum solitarii, sparsi, triandri. Perigonium proprium petaloideum. Stylus brevissimus: stigma 6–9-radiatum. Drupa baccata 6–9-pyrena. Semina pendula; radicula supera! — E. nigrum, *Linn.* E. rubrum, *Vahl.*

2. CERATIOLA, *Michx.*

Flores in axillis foliorum solitarii vel pauci aggregati, diandri. Perigonium proprium nullum. Stylus crassus: stigma foliaceum circa 4-partitum, lobis inciso-pinnatifidis. Drupa dipyrena. Semina erecta: radicula infera. — C. ericoides, *Michx.*

3. COREMA, *Don.* (Tuckermania, *Kl.* Oakesia, *Tuckerm.*)

Flores capitati, bracteis squamæformibus suffulti. Perigonium proprium nullum. Stylus gracilis, 3- (nunc 4–5-) fidus, lobis angustis. Drupa sæpius tripyrena, parva. Semina erecta: radicula infera. — C. alba, *Don.* C. Conradii, *Torrey & Gray.*

TAB. I. *Oakesia* (potius *Corema*) *Conradii*, staminate, pistillate, and fruiting specimens, of the natural size. *Fig.* 1. Leaves, magnified; view of the upper and under sides. *Fig.* 2. Capitulum of the sterile flowers, enlarged. *Fig.* 3. Magnified staminate flower, with the three inner enveloping scales (corolla, of *Klotzsch*) spread open (the stamens in this instance four in number). *Fig.* 4. Magnified staminate flower, with the two innermost scales united on one side. *Fig.* 5. Pollen (consisting of four combined grains), highly magnified. *Fig.* 6. A magnified subhermaphrodite flower, with its scales spread open, showing an abortive pistil, and the one-celled anthers; in one of the stamens there is the rudiment of the second anther-cell. *Fig.* 7. Enlarged hermaphrodite flower, with one dimidiate stamen, and two rudimentary filaments; the pistil normal. *Fig.* 8. Hermaphrodite flower, the stamens all with dimidiate anthers. *Fig.* 9. Capitulum of fertile flowers, enlarged. *Fig.* 10. Magnified pistillate flower, with the inner scales. *Fig.* 11. Magnified pistillate flower, with a four-cleft style, and the scales spread open. *Fig.* 12. A drupe, cut across, magnified. *Fig.* 13. One of the detached pyrenæ, cut across, and more magnified. *Fig.* 14. Vertical section of a drupe, magnified; the section passing through one pyrena, seed, and embryo, and leaving the other pyrena entire. *Fig.* 15. The embryo detached, and more magnified.

SCHWEINITZIA ODORATA, *Ell.*

TAB. II.

SCHWEINITZIA, *Ell. Sk. Bot. S. Car. & Georg.*, 1. *p.* 478.

Calyx quinquesepalus, marcescens ; sepalis carinato-concavis, basi vix bigibbosis. Corolla campanulata, persistens, breviter quinqueloba, carnosula, basi quinquegibbosa; lobis ovatis patentibus. Stamina 10, hypogyna: filamenta subulato-filiformia, glabra: antheræ juxta apicem introrsim affixæ (in alabastro non reversæ), didymæ, biloculares, loculis sacculiformibus vertice foramine amplissimo hiantibus. Pollen simplex. Ovarium subglobosum, basi disco hypogyno decemcrenato, dentibus staminibus alternantibus, cinctum, quinqueloculare, loculis multiovulatis: stylus brevis, crassus: stigma pentagonum, leviter quinquecrenatum, umbilicatum. Capsula . . . . .

Rhizophytum hypopythoideum, humile, badium, glaberrimum ; floribus consimilibus spicatis, odorem Violæ spirantibus : corolla carnea.

S. ODORATA, *Ell., l. c.; Nutt. Gen.* 2. *p.* 270 (*Suppl.*); *DC. Prodr.* 7. *p.* 780.

S. Caroliniana, *Don, Gen. Syst.* 3. *p.* 867.
Monotropsis odorata, *Schwein. in Ell., l. c.*

HAB. In sylvis, humi pingui, frondibus delapsis quan-

doque latens, Carolinæ Septentrionalis juxta Salem, ubi detexit beat. *Schweinitz ;* necnon sub scopulo " Table Mountain " dicto cl. *Sullivant* mecum legit. Prope urbem Baltimore in Marylandia, cl. *Griffith.* Primo vere floret.

Very few phanerogamous plants of the United States are so little known as the Schweinitzia. Excepting the discoverer, whose name it bears, no botanist had met with it until it was gathered in the neighbourhood of Baltimore a few years ago by Dr. Griffith. In the autumn of 1843, Mr. Sullivant and myself were so fortunate as to find a few specimens at the base of Table Mountain, North Carolina.* Our specimens were growing in a cluster from the roots of Galax, upon which they appeared to be parasitic. As we removed the whole mass, with the hope of securing the plant in a living state, we did not examine the mode of attachment, which is so difficult to make out in other Monotropeæ, and which is so doubtful in the case of Monotropa itself.† The specimens already (in September) bore well formed flower-buds, some of them nearly full sized and ready for expansion in the spring. From them were taken the specimens represented in the right and left hand figures of the accompanying plate. The central figure, from a specimen gathered by Dr. Griffith, represents the plant soon after flowering; when the short spike, which was before drooping, becomes erect.

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* *Amer. Journal of Science and Arts*, New Series, Vol. I., p. 18.

† The development of Monotropa, and its mode of parasitism, if there be any, is a subject upon which a series of original observations is greatly needed, and which would well reward the attention of a careful observer.

Several such simple stems spring in a cluster, from a coralloid-fibrous and matted root, to the height of two to four inches. They are purplish in color, and are thickly beset with the rather fleshy brownish scales which take the place of foliage; these are ovate, acute, one-nerved, spirally alternate, about three lines in length; the upper becoming rather larger and more crowded, forming the bracts of the spike, and partly enveloping the blossoms. The flowers, usually six or eight in number, are borne on very short pedicels, and are subtended by a pair of opposite bracteoles, which resemble the bracts, and are intermediate in size and shape between them and the sepals. The calyx consists of five imbricative sepals, as long as the corolla; these are scarious in texture in the dried state, ovate-oblong or lanceolate-oblong, acute or acutish, more or less concave, and slightly gibbous at the very base. The corolla is about one fourth of an inch long, thickish, of a firm fleshy texture, imbricated in æstivation, and with five rather strong gibbosities at the base, corresponding with the lobes. The stamens are a little shorter than the corolla; the anthers are nearly as broad as long; the two short saccate cells are somewhat enlarged downwards, and are united by their contiguous faces without any connective; they are attached to the filament by a point at or near their summit on the outside, so that they are introrse. They are not retroverted before anthesis, like those of Pyrola,* but are turned inwards from the first. I notice, however, that, in the young flower-bud, the anther is usually turned nearly at a right angle with the filament, so that the points which mark the apical foramina are lateral. By the time the corolla expands, the anthers have assumed their normal position, and appear pendent from the filament, as is shown in Fig. 7 and Fig. 8. The open pores, if they may be so called, through which the pollen is discharged, are so large, that, like the mouth of a sac or purse, they now occupy the whole summit of the cell. At first, each anther-cell is divided by a transverse septum, the vestiges of which are sometimes distinctly visible after the pollen is discharged. The pollen is simple, as in all other Monotropeæ. But in examining, with the higher powers of the microscope, the pollen taken from autumn flower-buds, I found that what before appeared like simple grains consisted of mother-cells, each containing two, three, or commonly four, distinct pollen-grains. These are shown in Fig. 9, under an amplification of about three hundred diameters. The five-sided umbilicate stigma is apparently composed of five erect and connate lobes. A section of the ovary appears very much as in Monotropa. The thick placental axis projects two lobes into each cell, which are thickly covered with innumerable minute ovules. An apparently fertilized ovule, or growing seed, as it appears when strongly magnified, is given at Fig. 12. The mature seeds and the fruit are unknown.

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* By almost every writer, from Wahlenberg and Don to Koch, De Candolle, and Endlicher, the anthers of Pyrola are said to open by *basal* pores, and to be *inverted* during flowering. The pores, are, however, really *apical*, as in Ericaceæ proper; the anthers are *retroverted* in the flower-bud, as is common in the order, and resume the truly normal position soon after the flower opens. The correct view was adopted by Dr. Torrey, in his *Flora of the Northern and Middle States*, p. 432.

The late Mr. Von Schweinitz, the distinguished botanist who discovered this remarkable plant, sent to Mr. Elliott the brief description published in the work before cited, which is excellent, as far as it goes; — Mr. Elliott at the same time proposing to change the name *Monotropsis*, given by Schweinitz, to *Schweinitzia*, in honor of the discoverer. In the supplement to his *Genera of North American Plants*, Mr. Nuttall has somewhat altered, but not improved, the character of the genus. The anthers, according to Nuttall, are "adnate to the filaments, one-celled, opening from the inverted base by two naked pores." The anthers are, however, plainly two-celled at every stage, and their orifices were probably assumed to be basal on account of their obvious resemblance to those of Pyrola, which are (wrongly) so described by Nuttall and most other authors. These characters were copied by Don,* and the latter has been adopted by Endlicher,† and, on Nuttall's authority, by De Candolle, who, although he possessed a specimen of the plant, appears not to have investigated the structure of the flower. Sprengel cites Monotropsis as a synonym under Monotropa.‡

The small group of Monotropeæ may be said to consist of Ericineæ or Pyroleæ without green foliage, and with the mode of life and the aspect of Orobanchaceæ. They have apparently no other combining character. The anthers of Schweinitzia open by pores; those of Pterospora open longitudinally, though they are otherwise, as well as the corolla, much the same as in Andromeda. The anthers of Hypopitys open by a continuous transverse line into two very unequal valves; those of Monotropa, which stand transversely on the apex of the filament, open by two terminal transverse chinks. Lindley gives indeed another character, namely, that "there is a difference in the position of the embryo, that organ being at the apex of the albumen in Monotropeæ," but at the base in other Ericaceæ. § But the embryo of Monotropeæ is entirely unknown, except as to Pterospora; and even with regard to this the observation greatly needs verification.

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* *Gen. Syst. Gard. & Bot.*, Vol. III., p. 867. The name is here inadvertently changed to "S. Caroliniana, *Ell.*"

† *Genera Plantarum*, p. 761.

‡ *Genera Plantarum*, Vol. I., p. 347.

§ *Lindley*, *Introd. Nat. Syst.*, ed. 2, p. 219, and *Veg. Kingdom*, p. 452.

Tab. II. *Schweinitzia odorata*, of the natural size. ***Fig.*** 1. A detached flower, enlarged. ***Fig.*** 2. A flower, enlarged, with the sepals spread open. ***Fig.*** 3. Unexpanded corolla, from an autumnal flower-bud. ***Figs.*** 4, 5. Two sepals of the same. ***Fig.*** 6. Corolla laid open. ***Fig.*** 7. Magnified flower, the calyx and corolla removed. ***Fig.*** 8. A stamen, more magnified. ***Fig.*** 9. Pollen from young anthers, highly magnified; the 2 – 4 grains still inclosed in mother-cells. ***Fig.*** 10. Separate simple pollen-grains, equally magnified. ***Fig.*** 11. Transverse section of the ovary. ***Fig.*** 12. A fertilized ovule, highly magnified.

OBOLARIA VIRGINICA, *Linn.*

TAB. III.

OBOLARIA, *Linn. Gen. no.* 778.

Calyx diphyllus; sepala foliiformia, spathulato-oblonga, patentia, in floribus axillaribus lateralia. Corolla tubuloso-campanulata, marcescens, regularis, ad medium æqualiter quadrifida; lobis ovali-oblongis, demum oblongo-spathulatis, parce denticulatis; æstivatione imbricativa. Stamina 4, in sinubus corollæ inserta: filamenta brevia, æqualia: antheræ subglobosæ nunc sagittiformes, loculis longitudinaliter dehiscentibus: pollen globosum, membrana tenuissima lævissima. Ovarium ovoideum, stylo brevi stigmatibusque 2 ovalibus subplanis persistentibus coronatum, uniloculare, etsi processibus endocarpii semi-bi–tri-loculare, vel sæpius cruciatim semi-quadriloculare, parietibus undique ovuliferis. Ovula numerosissima, anatropa. Capsula polysperma, membranacea, septicida? Semina immatura testa laxa cellulosa donata, nucleum parvum includentia.

Herba spithamæa, glaberrima, carnosula; radice perenni, ramosa, e fibris crassiusculis; caule subsimplici tetragono; foliis oppositis, sessilibus, obovato-cuneatis, sæpe retusis, integerrimis, leviter quinque–septem-nervatis, livido-viridibus et purpureo tinctis, plerisque versus apicem caulis approximatis; imis squamæformibus vel obsoletis, quandoque alternis; inflorescentia centrifuga, floribus terminalibus axillaribusque solitariis tribusve, ad apicem pedunculi brevis inter bracteas foliiformes sessilibus. Corolla albida, sæpe lilacino vel purpureo tincta.

O. Virginica, ***Linn. Spec.* 2. *p.* 632 (*Gronov. Fl. Virg.*, *ed.* 2. *p.* 95); *Nutt. Gen.* 1. *p.* 103; *Ell. Sk.* 2. *p.* 134; *Darlingt. Fl. Cest.*, *ed.* 1. *p.* 21, *t.* 2; *Barton, Fl. N. Amer.* 3. *t.* 90.**

Obularia, *Linn. Hort. Cliff.*, *p.* 323.

Orobanche Virginiana, radice coralloide, summo caule foliis subrotundis. *Moris. Hist.*, 3. *p.* 504, *t.* 16, *f.* 23.

Orobanche Virginiana, radice fibrosa, etc., *Pluk. Alm.*, *t.* 209, *f.* 6.

Anonymos humilis, Aprili florens, floribus pallide rubentibus, etc., *Clayt. Fl. Virg.*, *l. c.*

Schultzia obolarioides, *Raf. in N. Y. Med. Repos.*, 2. *hex.* 5. *p.* 350?

Hab. In solo pingui sylvarum Novæ Cæsareæ, Pennsylvaniæ, Ohionis, Virginiæ, usque ad Carolinam Australem et Texas, rarius; primo vere florens.

This plant has been several times figured, but never with the requisite analyses. On this account, and because its remarkable peculiarities have remained unnoticed, and its place in the natural system doubtful, I am induced to attempt its illustration.

Linnæus founded the genus upon specimens sent from Virginia by Clayton to Gronovius, transferring to it the name formerly proposed by Siëgesbeck for Linnæa.* He did not characterize it well

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* "Obularia dicta fuit ob convenientiam foliorum cum figura obulorum, præsertim Ruthenicorum." *Linn. Hort. Cliff.*, p. 323.

in the *Genera Plantarum*, where the corolla is said to be unequally four-cleft, and the stamens didynamous. The genus was accordingly placed in the class Didynamia, next to Orobanche. The two-leaved calyx, if such it be, Linnæus considered rather as a pair of bracts. From the expression, " Capsula . . . . bivalvis, dissepimento opposito," it may be inferred that he took the ovary to be two-celled. Nevertheless, Jussieu,* who professes to have derived his generic character from Linnæus, ascribes to the plant a one-celled capsule. He includes the genus in that section of his order Pediculares (III. Genera Pedicularibus affinia), which answers to his Orobancheæ, subsequently so called.† Persoon briefly remarks, that Obolaria is quite different from Orobanche in habit, though agreeing with it as to the flower.‡ By some inadvertence, he has attributed to it a " calyx quinquefidus."

To Dr. Darlington belongs the credit of having first shown that the corolla of Obolaria was regular and the stamens equal, — points which he indicated to Professor Barton, and afterwards to Mr. Nuttall.§ In the *Genera of North American Plants*, Mr. Nuttall, coinciding in this view, describes the stamens as equal, and places the genus in the Linnæan class Tetrandria. He describes the capsule simply as " one-celled, two-valved, many-seeded ; seeds minute." Premising that the plant is bitter (which it certainly is, though not strongly so), and probably tonic, Nuttall makes the important statement, that the genus " distinctly appertains to the natural order *Gentianeæ* of Jussieu." Dr. W. P. C. Barton, who, in the work above cited, has given a tolerable figure of the plant, follows Nuttall in referring the genus to Gentianeæ. Sprengel appears to be the only succeeding author who has adopted this view.* Elliott, although he has introduced the genus under the class Didynamia, states that the plant, "from the structure of the corolla and the insertion of the stamens, certainly belongs to the class Tetrandria." † He makes no remark respecting its natural affinity. But in his account we meet with the earliest, and indeed the only, indication of any peculiarity in the structure of the ovary. He describes the capsule as "four-celled? or perhaps one-celled with the rudiments of partitions."

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* *Genera Plantarum*, p. 101.

† *Ann. Mus.*, Vol. XII., p. 445.

‡ *Synopsis Plantarum*, Vol. II., p. 182.

§ *Florula Cestrica*, ed. 1, p. 21, where there is a good description and a pretty good figure of the plant in question, which is placed in the artificial class Tetrandria.

The late Professor Don,‡ in a revision of the order Orobancheæ, appends to it a tribe *Obolariæ*, comprising Obolaria and the (totally unlike) genus Tozzia, which are merely said to differ from Orobancheæ proper in being terrestrial instead of parasitical. Bartling § also enumerates the genus Obolaria under Orobancheæ. So, likewise, does Lindley, both in his *Introduction to the Natural System*, and in the recent *Vegetable Kingdom*. Endlicher, on the other hand, has placed the genus among the "Scrophularineis affinia," remarking that it appears not to belong to the Orobancheæ, but may perhaps be referable to the Gentianeæ.|| The structure of the ovary and of the capsule are described by Endlicher in somewhat incongruous terms. The *ovary* is said to be *one-celled, with two parietal placentæ*, while the *capsule* is said to be *two-celled, two-valved, the valves placentiferous in the middle.* Neither of these

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* *Genera Plantarum*, Vol. I., p. 110.

† *Sketch of the Botany of South Carolina and Georgia*, Vol. II., p. 134.

‡ In *Edinb. Phil. Journ.*, Vol. XIX., p. 113.

§ *Ordines Naturales*, p. 174.

|| *Genera Plantarum*, p. 695.

statements accords with our observation. The dehiscence of the capsule, however, I have not seen; but I can scarcely doubt that it is septicidal, or, in other words, that the carpels separate from their margins. Meisner* has followed Endlicher in appending Obolaria to the order Scrophulariaceæ. Grisebach † has neither included it in the order Gentianeæ, nor mentioned it among the genera which have been referred to that order; the remark by Nuttall and its adoption by Sprengel having probably been overlooked by him.

It is manifest, from the foregoing summary of what is on record respecting Obolaria, that its affinities are still unsettled, and that the peculiar structure of the ovary has not been made known. This peculiarity, which I have endeavoured to express in the detailed generic character given above, and in the accompanying analyses, was first noticed in the living plant by Professor Torrey and myself, in the spring of the year 1843.

A view of the transverse section of the ovary, considerably enlarged, is given at Figure 11 of the accompanying plate. The parietes of the ovary consist, first, of a thin exterior coat, composed of compressed cellular tissue alone, and quite similar to the skin or epidermis, which readily peels from the stem, &c. This coat is but slightly coherent with the parts subjacent, except at the two longitudinal lines, which, alternating with the lobes of the stigma, evidently correspond to the margins of the carpels, and doubtless with the lines of dehiscence at maturity. The outer coat does not follow the introflexions of the interior, or endocarpic, portion; and the intervening space is partially filled by a little very loose and filmy cellular tissue. The inner portion of the parietes is much thicker and more fleshy than the outer; it commonly presents four equidistant projections or folds, which partially divide the cavity in a cruciate manner; but occasionally one of these, or two opposite ones, are partially or altogether wanting. These four placentiform folds may be directly compared with the four nearly equidistant placentæ of *Anoplanthus* (*Orobanche*) *uniflorus*, with which they agree in position; that is, two of them are borne on the face of each carpel, about half way between its edges (marked by the line alternating with the stigmas) and the axis (where the midrib is represented by a slender line or cord of vessels, shown in the middle of Fig. 12, which may be traced upwards through the style to the stigma); so that they might be taken for submarginal half-placentæ. But here we find a further peculiarity in Obolaria, namely, that not merely these placenta-like processes, but the whole lining of the cell, is equally and uniformly ovuliferous! Of this, no parallel instance is known, I believe, in a unilocular compound ovary, although it occurs in a few plants with apocarpous ovaries, and in one small family (Nymphæaceæ) with a compound multilocular fruit; but to none of these does Obolaria exhibit any other points of similarity.

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* *Plantæ Vasculares*, p. 313.

† *Genera et Species Gentianearum, etc.*, 1839, and GENTIANACEÆ *in DC. Prodr.*, Vol. IX.

The want of much cohesion, except at the sutures, between what I have called the outer and the inner parietes of the ovary naturally suggests another possible explanation of the anomalous placentation of Obolaria; namely, that the inner ovuliferous portion may consist of a pair of concave placentæ, completely lining the ovary, much as in Hydrophyllum, but perfectly united where their edges come in contact, and ovuliferous throughout their whole sinuously biplicate inner face. But no trace of such union can be detected at those sinuses which correspond with the axis of each carpel; and besides, this same endocarpic portion certainly makes up a part of the thickness of the style, as well as of the walls of the ovary.

Some points concerning the *position* of the flowers and their parts deserve notice. The axillary flowers are often solitary, when the short peduncle is bractless; otherwise they are three in a cluster or cymule; the two lateral being sessile, or nearly so, close at the base of the terminal, each arising from the axil of a bract resembling the sepals, or, indeed, the leaves. When the flower is solitary, the sepals (as we are obliged to term them) are uniformly lateral, as in the diagram, Fig. 6. Where the lateral axis bears three flowers, these are commonly disposed as is represented in the diagram, Fig. 1; that is, the two additional flowers are placed right and left, having, of course, the same relation to the central flower which that, when solitary, has to the main axis. The sepals of the central flower in this case are not *lateral*, but *anterior* and *posterior*, namely, one next the axis, the other next the bracteal leaf. It is obvious, therefore, that the same organs which stand for the calyx of the solitary flower, Fig. 6, form the bracts of the three-flowered cluster in Fig. 1; the calyx of the central flower in this latter case being just the next pair of leaves of the branch, decussating with the first pair, and therefore necessarily standing fore and aft, as respects the primary axis and cauline leaf. This gives some apparent confirmation to the Linnæan view, that what is called the *calyx* of Obolaria is no part of the flower, but rather a pair of bracts. The three flowers of the axillary clusters are not always thus disposed in a line at right angles (or nearly so) with that passing through the stem and cauline leaf. This is the prevalent, but not the uniform, mode. Dr. Torrey called my attention to the fact, that not unfrequently one or more of the clusters stand in the opposite plane, the bracts being *anterior* and *posterior*, and the three flowers consequently occupying the line that passes through the cauline leaf and the main stem. An instance of the sort furnished the diagram, Fig. 2.

The position of the two constituent carpels of the ovary to the axis, and to the sepals, may be next considered. In the solitary axillary flower, the lobes of the stigma, and consequently the carpels, are commonly right and left, and parallel with the sepals, as in the diagram, Fig. 6, where the two oval figures placed in the centre represent the lobes of the stigma, and the two outer lateral lines, the sepals. Yet, in some cases, I have found the stigmas placed anterior and posterior, the two sepals remaining lateral, and therefore *alternate* with the sepals, instead of *opposed* to them, as is usual in this plant. This remark is equally applicable to the lateral flowers of the cluster of three. Although the stigmas are generally opposed to the sepals, and consequently lateral as respects the secondary bract, as in both diagrams, Figs. 1 and 2, yet in about three cases out of thirteen the stigmas alternate with the sepals, and are therefore opposed to the secondary bract and axis, that is, are anterior and posterior.* This prevalent opposition of the carpels to the sepals (with which they happen in this case to agree in number), so contrary to the general rule in Dicotyledones,† might be held to give additional probability to the idea that what are here called sepals are really bracts, — a view taken by Linnæus, doubtless on account of their close resemblance to the proper leaves of the plant, but which may also be maintained, as already intimated, from the relation borne by what are called the sepals of the solitary flower to the bracts of the cluster, as well as from their want of agreement in number with the divisions of the corolla. But, on the other hand, the Gentian family, with which Obolaria is to be particularly compared, presents one of these same exceptional cases; their carpels being commonly (although, as in Obolaria itself, not uniformly) right and left of the axis, and consequently opposite the lateral sepals.

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* In one cluster, the stigmas of one of the lateral flowers were seen to be anterior and posterior, while those of the other flower were right and left.

† *R. Brown*, *Observ. Pl. Oudney*, pp. 33, 38.

It is now evident, that the only natural orders to which Obolaria has any obvious relationship are those two to which it has been variously referred, namely, Gentianaceæ and Orobanchaceæ. The singular introflexions or processes analogous to the double (or rather separated) placentæ of some Orobanchaceæ would seem to favor its alliance with that order, in which, perhaps, the distribution of the ovules over the whole surface of the cell might the rather be expected. The (commonly) lateral position of the carpels would favor the association of Obolaria with Orobanchaceæ as much as with Gentianaceæ, if Lindley and Endlicher have correctly attributed this character to the former order. But against this is the much higher authority of Brown, who believes the carpels to be anterior and posterior in Orobancheæ.* The weight of this character, therefore, falls in favor of Gentianaceæ. The regular corolla, equal and isomerous stamens, and opposite leaves, are also points of difference from Orobanchaceæ, and of agreement with Gentianaceæ; to which may be added the green foliage and terrestrial growth, which would be altogether anomalous in the former family (although, on the other hand, one Gentianaceous genus is parasitic). The only point essentially at variance with the admitted character of Gentianaceæ is, unfortunately, one which is placed in the foremost rank by Grisebach, namely, the æstivation of the corolla. In Obolaria, the lobes of the corolla are *imbricated* in the bud, instead of convolute, as in the true Gentianaceæ, or induplicate, as in the Menyantheæ.* On this account, it might be proper to consider the genus as the representative of a third group, of equal rank with the Menyantheæ; and in this form it will accordingly be appended to the order Gentianaceæ, in the forthcoming portion of the *Flora of North America*, by Dr. Torrey and myself.

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* *Plantæ Javan. Rariores*, p. 112, note.—The carpels are certainly anterior and posterior in *Epiphegus*.

⁂ One or two mistakes have been committed in the analyses on the accompanying plate, which were not observed in time for correction. In Fig. 3, the leaves of the calyx are wrongly represented as decidedly distant from the base of the corolla, while, in fact, there is no such manifest interval. In Fig. 4, the sinuses of the corolla (laid open) should be of equal depth, and should extend to the insertion of the stamens; the filaments, moreover, are rather too short.

TAB. III. *Obolaria Virginica*, of the natural size. *Fig.* 1. Diagram illustrating the ordinary disposition, &c., of the three flowers of the axillary cluster. *Fig.* 2. Diagram of the *occasional* disposition of the same. In both, the lower crescentic line represents a section of the subtending leaf; the upper circular one, a section of the axis; the outer pair of the smaller crescentic lines stands for the bracts of the cluster ; the others are the sepals of the respective flowers ; the circles they subtend stand for the corolla ; the figures in their centre denote the position of the lobes of the stigma. ***Fig***. 6. Diagram of the solitary axillary flower, and the æstivation of its corolla ; the bract, axis, sepals, and lobes of the stigma are represented as in the foregoing ; the series next within the sepals illustrates the æstivation of the corolla. ***Fig***. 3. A separated solitary axillary flower, with its subtending bracteal leaf. ***Fig***. 4. The corolla laid open, enlarged (corrected as above). ***Fig***. 5. A stamen, more magnified. ***Fig***. 8. The pistil magnified. ***Fig***. 9. Apex of the style, with the stigmas, highly magnified. ***Fig***. 10. A fertilized ovule, highly magnified. ***Fig***. 11. The fructified pistil, with a cross-section of the ovary, showing the relation of the lobes of the stigma to the introflexed processes of the parietes, and the attachment of the ovules to the whole face of the cell. ***Fig***. 7. Diagram of the same ; the two oval approximate lines above denote the lobes of the stigma ; the two minute circles placed right and left within the thickness of the walls of the ovary stand at the middle of the carpels ; the introflexed lines at right angles with these indicate their margins or sutures. ***Fig***. 12. One of the carpels or valves, separated through the sutures, style, and stigma, and spread open, the ovules having been removed.

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* Perhaps there is a tendency at present to consider the characters drawn from æstivation as more absolute and constant than they really are. Exceptional cases, as well as variations in the same species, will be found by no means uncommon. For example, although the æstivation of the petals is deemed to be universally convolute or twisted in Geranium and its allies, yet they are sometimes regularly *imbricated* in Geranium maculatum, or, in a greater number of cases, while four of the petals are convolute, the exterior one is wrapped around the others in the bud. I have also observed this anomaly in G. Robertianum, G. sanguineum, and G. collinum. So, likewise, the æstivation of the petals of Boykinia aconitifolia, *Nutt.*, is convolute, or perhaps sometimes convolute with the outer petal imbricative, while in other true Saxifrageæ the æstivation is regularly imbricated.

GAILLARDIA AMBLYODON, *Gay*.

TAB. IV.

G. AMBLYODON : annua; caule ramisque diffusis hirtellis ; foliis oblongis basi subauriculata sessilibus supra medium denticulatis serratisve, inferioribus subspathulatis ; squamis involucri linearibus setaceo-acuminatis hispido-ciliatis tri – quadriseriatis conformibus basi callosa longiuscule coarctatis, mediis longioribus ; ligulis (croceo-flammeis) 12 – 14 confertis ; dentibus corollæ disci ovatis obtusis ; fimbrillis receptaculi setiformibus crebris achenium parum superantibus ; pappo radii exaristato !

G. amblyodon, *Gay, in Ann. Sci. Nat.* (*ser.* 2), 11. *p.* 57 ; *Torr. & Gray, Fl. N. Amer.* 2. *p.* 367 ; *Engelm. & Gray, Pl. Lindheim., no.* 104.

HAB. In arenosis provinciæ Texas, ubi collegerunt *Drummond, Lindheimer, Wright.* Floret ineunte æstate ; in horto usque ad ultimum autumnum.

This species, without doubt the most showy of the genus, was first raised in the Cambridge Botanic Garden in the summer of 1845, from seeds sent from Texas by that assiduous collector, Mr. Lindheimer. It ripened seeds freely, from which the species is again cultivated the present season.

The plant grows after the manner of G. pulchella and G. picta, but is ranker, branching freely, forming ample clumps, two to three feet in height, and producing a succession of blossoms until it is

arrested by frost. The foliage is of a lighter hue than is represented in the engraving. The leaves are rather thick and fleshy, clothed with a minute and inconspicuous close pubescence; and the midrib beneath is sparingly fringed with bristly hairs similar to those which beset the stem, branches, and involucre. The capitulum, with the expanded rays, is fully two inches in diameter. The callous bases of the scales of the involucre are more strongly coarctate than in any other species. The spreading foliaceous part of the scales is usually very narrow, but in some spontaneous specimens the exterior are more or less dilated. The rays are closely set, cuneate-oblong in shape, three-lobed at the apex merely; their upper surface is of a deep cinnabar color, verging to orange towards the tips, especially in fading, but gradually deepening to red-brown next the base; the lower surface is browner than the upper. The tips of the exterior disk-corollas are very deep brown-purple, as are also the exserted filiform lobes of the style; while the central flowers are generally yellow. The disk-flowers persist in fruit, when they are quite showy, having much the appearance of a Scabious. The pappus consists of six to eight scarious and chaff-like ovate-lanceolate scales; those of the disk produced into awns, about the length of the corolla, as in the other species of the genus, while those of the ray-flowers are remarkable for being awnless. The specific name was chosen by M. Gay to express this peculiarity.

Tab. IV. *Gaillardia amblyodon*; branch of the natural size. *Fig.* 1. Ray-flower; the involucellate villous tuft at the base of the ovary spread open. *Fig.* 2. Disk-flower. *Fig.* 3. Capitulum, with the flowers removed, to show the acicular fimbrillæ of the receptacle. *Fig.* 4. Two of the fimbrillæ detached. *Fig.* 5. Achenium from the disk, with the pappus. All but Fig. 3 more or less magnified.

BRAZORIA TRUNCATA, *Engelm. & Gray.*

TAB. V.

BRAZORIA, *Engelm. & Gray, Pl. Lindheimerianæ, p.* 47.

Calyx late campanulatus, bilabiatus (labio superiore breviter tri- inferiore bilobo), per anthesin inflatus, fructifer auctus, membranaceus, reticulato-venosus, antice planiusculus, postice gibbosus, e surrectione labii inferioris clausus. Corolla tubo longe exserto, fauce inflata; limbi bilabiati labio superiore erecto, subgaleato, apice bilobo vel integro; inferiore tripartito, lobis patentibus vel recurvis rotundatis. Stamina 4, sub labio superiore adscendentia, manifeste didynama: filamenta supra medium corollæ adnata, ubi pilosa, inferioribus elatioribus: antheræ per paria approximatæ, biloculares, loculis distinctis divaricantibus ad rimam plus minusve ciliatis. Stylus glaber, apice subæqualiter bifidus, lobis subulatis. Achenia sicca.

Herbæ annuæ Texanæ, erectæ, Physostegiæ facie; foliis sessilibus oblongis denticulatis; floribus in spicis strictis quadrifariam congestis; corolla rosea, fauce albida vel luteola, purpureo guttata.

§ 1. Eubrazoria. Calycis lobi latissimi, subæquales, truncati. Corollæ majusculæ faux infra lobum anticum intrusa, quodammodo palatum efficiente. Achenia triangulata, pubera.

B. TRUNCATA: caule pubescente; spica densa; calyce bracteam ovatam æquante basi hirta, lobis brevissimis dilatatis labii superioris mucronulatis, inferioris eroso-denticulatis; labio corollæ ad faucem postice villosæ superiore breviter bilobo, inferiore subæqualiter tripartito, lobis reflexis apice bifidis emarginatisve, omnibus crenulato-erosis.

B. truncata, *Engelm. & Gray, l. c., no.* 287 (excl. syn. *Hook. Bot. Mag.*).
Physostegia truncata, *Benth. Lab., p.* 505, non *Hook.*

HAB. In provincia Texas (*Berlandier, Drummond, Wright*), præsertim secundum fluvium *Brazos* dictum (unde nomen genericum), in campis arenosis, formiceta derelicta diligens, ex *Lindheimer*. Floret æstate.

This plant was first gathered by Berlandier, who communicated to Sir William Hooker the "very indifferent specimens" from which Bentham described it, in his excellent monograph of the family, under the name of Physostegia truncata. Had he possessed fruiting specimens, he would scarcely have joined to Physostegia a plant so distinct in its floral characters, however similar in aspect. Good specimens were afterwards collected by Drummond, who, "in 1833 and 1834, found it abundantly about San Felipe de Austin, and communicated specimens and seeds to Europe."* They were distributed under No. 274 of his third Texan collection, mixed, however, with those of a different species. It was from seeds of this last species that the specimens were raised which Hooker figured and described in the *Botanical Magazine* (t. 3494), mistaking

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* Hooker, *Bot. Mag.*, sub. t. 3494.

it for the real Physostegia truncata of Bentham, and altering the specific character to make it accord with the plant before him.

These two species were subsequently gathered by Lindheimer, and distributed as No. 286 and No. 287 of his collection for 1844.* So numerous are their points of difference, that Dr. Engelmann, who had noticed them with his usual accuracy, proposed to consider the two as the types of distinct genera. I preferred, however, to combine them, in view of their entire agreement in habit, and in the mode in which the enlarged and gibbous fructiferous calyx is closed by the appression of the lower lip, notwithstanding the striking differences in the form of the calyx as well as of the corolla. The character of Brazoria was accordingly framed so as to embrace the two species, *B. truncata* and *B. scutellarioides.* But, through inadvertence, the synonym of *Hook. Bot. Mag.*, t. 3494, was cited under the former species, instead of being referred to B. scutellarioides, where it really belongs.

The genus is well distinguished, not only by the remarkable calyx, but by the manifestly didynamous stamens, the divaricating anther-cells, &c.

Brazoria truncata is a rather showy annual, with the stem nearly simple, or else branched from the base, about a foot high, terminated by a single spike, and sometimes with one or two lateral ones from its base. The corollas are an inch long, dull purplish rose-color, slightly striped and conspicuously dotted with deep purple; the lower lip is paler, and tinged with yellowish inside; the tube is pilose-annulate next the base. The stamens, inserted towards the summit of the tube, are a little exserted. In fruit, the spike, covered with the four-ranked persistent calyxes with their bracts, attains the length of six to nine inches. The calyx is then dry, scarious, and finely reticulated; the upper side is much more strongly gibbous than is shown in Fig. 9, so that the achenia are nearly concealed in the cavity; this is closed by the lower lip, which is now applied flatly against the upper, nearly covering its whole face. In *B. scutellarioides*, the lower lip is smaller and much narrower than the upper, but it covers the orifice in the same way.

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* By a typographical error, the two numbers are transposed in the published account (*Plantæ Lindheimerianæ*); where the first, namely, *Brazoria truncata*, should be No. 287, and the second, *B.* (*Stachyastrum*) *scutellarioides*, should be No. 286. There is also an obvious transposition in the description of the calyx of B. truncata. The lobes of the "lower lip of the calyx," instead of the *upper*, are said to be "merely mucronulate in the middle," and "those of the upper," instead of the *lower*, as it should be, "erose-denticulate."

The figure was made from specimens raised in the Cambridge Botanic Garden, from Texan seeds sent by Mr. Lindheimer.

TAB. V. *Brazoria truncata*. *Fig.* 1. Flowering stem, natural size. *Fig.* 2. Spike, with the summit of the stem, in fruit. *Fig.* 3. A flower, seen in front. (The lateral lobes of the lower lip are not represented as emarginate or two-cleft at the apex, which they almost always are.) *Fig.* 4. Upper lip of the corolla, with a portion of the tube. *Fig.* 5. Anterior part of the throat seen from within, to show the sort of palate. *Fig.* 6. Calyx and style, with the bract. *Fig.* 7. Fructiferous calyx, seen in front. *Fig.* 8. The same, seen laterally. *Fig.* 9. Front view of the same, with the lower lip separated and turned down. (The well defined and deep cavity at the base of the upper lip, inclosing the achenia, is not well shown in this figure, which was taken before maturity; nor is the fine reticulation of the calyx represented.) All the analyses are more or less enlarged.

SULLIVANTIA OHIONIS, *Torr. & Gray.*

TAB. VI.

SULLIVANTIA, *Torr. & Gr. adnot. in Sill. Journ.*, 42. *p.* 22.

Calyx inferne cum ovarii basi connatus, quinquefidus, æstivatione imbricativa quincunciali. Petala 5, parum irregulares, ovato-spathulata, acutiuscula, unguiculata, in sinubus calycis inserta, marcescentia; æstivatione imbricativa quincunciali. Stamina 5, ad basin calycis loborum inserta, iisdem opposita et breviora; antheræ cordato-ovatæ, apiculatæ, biloculares, longitudinaliter dehiscentibus. Ovarium stylis 2 brevissimis (stigmatibus simplicibus) bicorne, biloculare, placentis crassis dissepimento adnatis multiovulatis; ovulis adscendentibus. Capsula calyce fere inclusa eoque ad medium accreta, ovoidea, bilocularis, polysperma, apice per rostra brevia intus dehiscens. Semina sursum imbricata, scobiformia, testa laxa reticulata utrinque membranaceo-alata. Embryo fere albuminis carnosi longitudine: radicula cylindrica; cotyledonibus oblongis.

Herba perennis, dodrantalis; radice fibrosa; foliis plerisque radicalibus, glaberrimis, longe petiolatis, orbiculari-reniformibus sinu fere clauso, inciso-dentatis atque sublobatis, petiolis basi dilatatis; scapo gracili, reclinato, inferne alternatim uni–bifoliato, superne bracteato, paniculatim ramoso, una cum pedunculis laxe

cymoso-trichotomis calycibusque glanduloso-pubescentibus; floribus parvis (corolla alba calyce triplo superante); pedicellis brevibus, fructiferis decurvis.

S. Ohionis, *Torr. & Gr., l. c.*; *Gray, Excurs. to Mount. N. Carol. in Sill. Journn. & in Hook. Lond. Journ. Bot.*, 1. *p.* 228; *& Bot. Text-book, ed.* 1. *f.* 38.

Heuchera, n. sp.? *Sulliv. Cat. Pl. Columbus, Ohio.*
Saxifraga? Sullivantii, *Torr. & Gr. Fl. N. Amer.*, 1. *p.* 575.

Hab. In comitatu *Highland* Ohionis, ad declivia rupium calcariarum, in unico loco solum detexit cel. *Sullivant.* Floret Junio.

It is with peculiar propriety that this well marked Saxifragaceous genus bears its present name, since it has been found by no person except Mr. Sullivant, and is, so far as known, restricted to the State of Ohio. Indeed, it has yet been met with at a single locality only, in Highland county, on limestone cliffs which border a tributary of the Scioto, where, however, it grows in great abundance. The living plants, which Mr. Sullivant several years ago communicated to the Botanic Garden of the University, still continue to flourish on the steep slope of a simple rockwork, along with the allied *Boykinia aconitifolia* of Nuttall, the four species of *Heuchera* indigenous to the United States, *Saxifraga erosa*, *S. Careyana*, and an undescribed Saxifrage nearly related to the latter.*

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* Saxifraga Caroliniana (sp. nov.): glanduloso-pubescens; foliis omnibus radicalibus deltoideis ovatisve grosse dentatis e basi pl. m. truncata in petiolum marginatum abrupte angustatis; scapo paucibracteato paniculato-cymoso effuso; petalis

The accompanying figure was taken from cultivated specimens, which perfectly accord with the spontaneous plant.

In the *Flora of North America*, this plant, then known through specimens in flower only, was doubtfully appended to a group of ambiguous pentandrous species of Saxifraga. Afterwards, when the fruit and seeds furnished additional characters, it was separated to constitute a distinct genus, dedicated to the zealous and excellent botanist who discovered it. At the same time, the transference of the remaining pentandrous Saxifrages (*S. Richardsonii* and *S. ranunculifolia* of Hooker) to Boykinia was proposed.*

Thus considered, the genus Sullivantia is clearly distinguished from all its allies, except the remarkable *Leptarrhena*, by its scobiform and somewhat winged seeds; also from *Heuchera* by its two-

consimilibus ovatis subunguiculatis albis infra medium pallide bimaculatis sepala reflexa duplo superantibus; filamentis clavatis; carpellis discretis demum divaricatis turgidis calyce liberis. — Variat foliis ovato-oblongis vel rotundato-reniformibus, basi aut subcordatis aut cuneatis. — HAB. In declivibus humidis opacis montium altiorum Carolinæ Septentrionalis. In horto floret Maio – Junio.

Living plants of this species were gathered by myself in the Alleghany Mountains of North Carolina, and probably of Virginia also, in the autumn of 1843, along with those of S. Careyana, which this species so nearly resembles that the difference was not detected until both came into flower the ensuing spring. The characters of the two remain constant under cultivation. S. Caroliniana is distinguished from S. Careyana by its reflexed (instead of barely spreading) calyx, its more strongly bimaculate petals (those of S. Careyana prove to be spotted also but very faintly), and its decidedly clavate filaments, which in S. Careyana are filiform. S. Caroliniana belongs, therefore, to the section *Hydatica*.

* *Bot. Excursion to the Mountains of N. Carolina, in Sill. Journ., l. c.*, p. 21. — Mr. Fielding, in his *Sertum Plantarum*, t. 57, has published a good figure of *Boykinia aconitifolia*, justly remarking that it has no characters sufficient to separate it from the pentandrous Saxifrages above mentioned. He therefore refers it to Saxifraga. I have preferred to refer *them* to Boykinia.

celled ovary; from *Saxifraga*, by its pentandrous flowers; and from *Boykinia*, by its less adherent calyx, persistent petals, and very short stamens, to which I may now add the imbricative æstivation of its corolla. For in B. aconitifolia the petals are convolute in æstivation; which character, if it shall be found to hold good in the two Oregon species (a point that the advanced state of my specimens does not allow me to verify), will abundantly confirm the genus Boykinia.*

TAB. VI. *Sullivantia Ohionis*, of the natural size. *Fig.* 1. A cymule, in fruit. *Fig.* 2. A flower. *Fig.* 3. Same, with the calyx laid open. *Fig.* 4. Cross-section of an unripe capsule. *Fig.* 5. Vertical section of the same. *Fig.* 6. A seed. *Fig.* 7. Longitudinal section of the same, displaying the embryo. All the analyses more or less magnified.

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* This discovery strengthens the view I had formerly ventured to take, in appending *Philadelpheæ* to the order Saxifragaceæ (*Fl. N. Amer.* 1, p. 594), although other botanists think that there is only "some collateral relationship" between them. Excepting in the more numerous stamens, Philadelphus differs from Saxifragaceæ-Hydrangeæ only in the valvate calyx and convolute æstivation of the petals; the very characters which are unexpectedly exhibited in a true Saxifragea by Boykinia. Of course I follow De Candolle and Zuccarini in referring *Deutzia* — which has valvate petals and definite stamens — to the suborder Hydrangeæ; as also *Decumaria*, the petals of which, I believe, are not imbricated (as described by Endlicher), but valvate, with induplicate margins, like Deutzia, and which is very closely related to *Schizophragma*, Zucc., an undoubted Hydrangeaceous genus. (Vide *Fl. N. Amer.* 1, p. 593.) Lindley, however, in his *Vegetable Kingdom*, still comprises both Deutzia and Decumaria in his order Philadelphaceæ, although the ordinal character he assigns suffices to exclude them.

THERMOPSIS CAROLINIANA, *M. A. Curtis.*

TAB. VII.

T. CAROLINIANA: caule virgato simplicissimo glabro subglauco; foliolis obovati-oblongis margine subtusque parce pubescentibus petiolo longioribus; stipulis (magnis) rotundatis amplexicaulibus, supremis petiolum subæquantibus; racemo spicato elongato stricto calycibusque pubescenti-villosis; floribus irregulariter confertis verticillato-subternisve; bracteis ovatis pedicellem duplo excedentibus calyce parum brevioribus; staminibus vix persistentibus; leguminibus villosissimis lato-linearibus rectis planiusculis rachi appressis.

T. Caroliniana, *M. A. Curtis, in Sill. Journ.* 44. (1843), *p.* 80; *Benth. in Lond. Journ. Bot.*, 2. *p.* 432.

HAB. In sylvis montanis comitatuum *Haywood* et *Cherokee* Carolinæ Septentrionalis hinc inde detexuerunt *Rev. M. A. Curtis* (anno 1839) et *S. B. Buckley* (1842). Floret Junio, Julio.

This is an upright plant, with remarkably strict, and, for the most part, entirely simple stems, three feet high, terminated by a single and rather compact raceme, or spike, of bright yellow blossoms. The foliage is light green, a little glaucous; the leaves all trifoliolate, with the leaflets varying from two and a half to four inches in length, smooth and glabrous, except a sparing pubescence

beneath. The stipules, which are perfectly persistent, are one to two inches long. The flowers are three fourths of an inch in length, on pedicels which are only one or two lines long, so that the inflorescence is rather to be called a spike than a raceme. The upper lobe of the campanulate calyx is merely emarginate. The vexillum, as in the remaining species, is clearly shorter than the other petals; the inside below the reflexion is dotted with brownish; the summit is rather deeply two-cleft, which is not shown in the figure. The stamens persist after the petals fall, but usually disappear before the fruit is grown. The fruit-bearing spike is eight or ten inches in length, frequently ripening twenty to forty crowded pods. The legumes are erect and closely appressed, densely silky-villous, quite straight, about two inches long and a fifth of an inch wide, obtuse at the base and almost sessile, 10 – 12-seeded, seldom at all constricted by the abortion of a part of the seeds; the valves are rather convex till the pod is quite ripe, when they are nearly flat. Seeds oval, slightly reniform.

When the first volume of the *Flora of North America* was published, the authors knew of no species of this genus indigenous to the proper United States. Three species are now known, from the State of North Carolina, and are in cultivation at the Cambridge Botanic Garden. Two of them were proposed and characterized by the Rev. M. A. Curtis, in *Silliman's Journal* for January, 1843; and the same assiduous and excellent botanist was also, probably, the first to detect, in the *Baptisia mollis* of Michaux, the third of our species of Thermopsis.

Mr. Curtis discovered the entirely new and striking Thermopsis Caroliniana in the summer of 1839, among the mountains of the southwestern corner of North Carolina, near Pigeon river, in Haywood county, and also on the Hiwassee river, in Cherokee county.

It has since been met with only by Mr. Buckley at other localities in the same region. I raised the plant in the Cambridge Botanic Garden (where it is perfectly hardy) from seeds taken from a fruiting specimen kindly communicated by Mr. Buckley. The species appears to be most nearly allied to the Californian T. macrophylla.

Mr. Brown distinguished the genus Thermopsis from Baptisia by its persistent stamens and linear compressed legumes.* The first-named character, however, is scarcely applicable to the present species, and not at all to the two succeeding, in which the stamens are quite as deciduous as in Baptisia. In fact, they differ from that genus by their slender and flat pods alone. Mr. Bentham † relies upon the persistent stamens, and some attenuation of the base of the calyx (a character inappreciable in American specimens), and admits two Himalayan species with oblong or ovate legumes, which in one are slightly, in the other greatly, inflated. The pods of *T. alpina* are likewise said to be elliptical-oblong, but compressed. It is very difficult, therefore, to make out the diagnosis of these two genera, unless, indeed, *T. inflata* of Cambessèdes be referred to Baptisia, and the distinction be made to rest entirely on the compressed legumes.

TAB. VII. *Thermopsis Caroliniana*, natural size. *Fig.* 1. Portion of the raceme in fruit (when fully ripe the legumes are flatter). *Fig.* 2. Immature legume, with cross-section.

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* *Hort. Kew.*, ed. 2, Vol. III., p. 3.

† *London Journal of Botany*, Vol. II., p. 430.

THERMOPSIS FRAXINIFOLIA, *M. A. Curtis.*

TAB. VIII.

T. FRAXINIFOLIA : glaberrima, subglauca; caule ramoso ramisque flexuosis patentibus; foliolis ovato-oblongis basi cuneatis petiolum subexcedentibus ; stipulis lanceolatis petiolo brevioribus, summis præcipue ramealibus minimis nunc deciduis; racemis laxifloris declinatis; pedicellis filiformibus sparsis patentibus calyce triplo longioribus bracteas subulatas multoties superantibus ; staminibus deciduis ; leguminibus elongato-linearibus vix falcatis planis cinereo-puberulis patentissimis.

Thermopsis fraxinifolia, *M. A. Curtis, in Sill. Journ.*, 44. *p.* 81.
Baptisia mollis, *Nutt. Gen.*, 1. *p.* 281, non *Michx.*
Baptisia fraxinifolia, *Nutt. MSS.*, *ex Torr. & Gr. Fl. N. Amer.*, 1. *p.* 387.

HAB. In nemorosis ad "Table Mountain," Carolinæ Superioris, *Nuttall, Curtis*, etc.; atque in aliis locis inter montes comit. *Henderson* et *Macon* legit *S. B. Buckley*. Floret ineunte æstate.

This species has much the habit of Baptisia alba. The stems, which reach the height of about three feet, are more or less declined, and the numerous geniculate slender branches are widely spreading. These are nearly all terminated by a raceme, so that a succession of flowers is produced nearly through the summer; while *T. Caroliniana* and *T. mollis* bear only a single raceme. The stipules are quite variable; the lowest being sometimes almost

as long as the petioles, though commonly much shorter; the upper ones are smaller, but occasionally ovate instead of lanceolate; those of the lateral branches are quite minute and inconspicuous, linear or subulate; and all, though they cannot be called deciduous, are apt to fall long before the leaves. The foliage is bright green, paler or glaucescent beneath; the leaflets about two inches in length. The declined racemes are very loosely flowered; the terminal ones are eight or ten inches long, and many-flowered; the lateral short and 10–20-flowered. The inconspicuous bracts resemble the uppermost stipules, and are somewhat deciduous. The spreading pedicels vary from half an inch to an inch in length. The flowers are one third smaller than in T. Caroliniana. The calyx is glabrous, the lobes or teeth much shorter than the tube, tomentose-canescent inside, the upper one strongly two-toothed. Corolla light yellow; vexillum slightly two-lobed. The stamens fall with the petals, or soon after, just as in Baptisia. The linear ovary is canescent. The minutely hoary legumes vary from two to three and a half inches in length, though scarcely two lines in breadth. They are quite flat, straight, or slightly curved, scarcely stipitate and quite even when all the (twelve to twenty) seeds ripen; but, from the abortion of a part, the pods are often constricted, and also narrowed at the base, as if much stipitate.

The figure is taken from the living plant brought by myself from Table Mountain. This is the very locality assigned by Nuttall to his Baptisia mollis, which he afterwards proposed to call B. fraxinifolia; but that part of his description which relates to the height of the plant, and its pubescence, is applicable only to the true Podalyria mollis of Michaux.

TAB. VIII. *Thermopsis fraxinifolia;* summit of a stem, with the terminal raceme in young fruit; of the natural size.

THERMOPSIS MOLLIS, *M. A. Curtis, MSS.*

TAB. IX.

T. MOLLIS: cinereo-pubescens; caule humili parce ramoso ramisque flexuosis subdeclinatis; foliolis oblongo-ovatis vel cuneato-ovatis petiolum triplo excedentibus supra glabratis; stipulis ovatis lanceolatisve, caulinis petiolo vix brevioribus vetustate deciduis; racemo solitario decurvato; pedicellis subalternis erectiusculis bracteas oblongas æquantibus flore brevioribus; staminibus deciduis; leguminibus elongato-linearibus subfalcatis planis canescenti-puberulis dependentibus.

Podalyria mollis, *Michx. Fl. Bor. Am.*, 1. *p.* 264.

Baptisia mollis, *DC. Prodr.*, 2. *p.* 100; *Torr. & Gr. Fl. N. Amer.*, 1. *pp.* 387, 695 (excl. syn. *Nutt.*); *M. A. Curtis, in Sill. Journ.*, 42. *p.* 81.

HAB. In rupestribus comitatuum Mecklenburg (*Michaux*), Lincoln (*Hunter*), Stokes (*Schweinitz*), Orange (*Curtis*), etc., Carolinæ Superioris, haud infrequens. Aprili – Maio floret.

This plant is about a foot high when it begins to flower; but as the stem still elongates, and the branches continue to develope, it attains twice that height, though it produces only a solitary raceme. The foliage is dull green, and the whole plant hoary with a minute appressed pubescence. The leaves, however, become nearly

glabrous with age. The stipules are variable; those of the branches smaller in proportion, often linear, and much shorter than the petioles they subtend; the cauline ones fall by the time the fruit is matured. The raceme, of bright yellow flowers, is four to six inches long, rather crowded, with the pedicels (which are scarcely longer than the calyx) alternate, or occasionally some of them rather verticillate-aggregated, or two to three from the same foliaceous bract. The flowers are three fourths of an inch long. The teeth of the campanulate calyx are nearly as long as the tube, triangular, and acute. The stamens are nearly as deciduous as in T. fraxinifolia; and the ovaries, as well as the legumes, are much as in that species.

This species, though still little known to American botanists, appears to be generally distributed throughout the middle and upper parts of North Carolina, doubtless extending northward and southward into the adjacent States; but, so far as known, it does not reach to the mountains. The most eastern locality is at Hillsborough, from which live plants were communicated to the Cambridge Botanic Garden by my esteemed friend, the Rev. M. A. Curtis. When Mr. Curtis cleared up the confusion that prevailed respecting this species and T. fraxinifolia, he still retained it in Baptisia, and described the legume, from imperfect and apparently abnormal specimens, as "oblong and turgid." But afterwards, on observing the perfect pods, he at once recognized it as a congener of his *T. fraxinifolia* and *T. Caroliniana.*

TAB. IX. *Thermopsis mollis;* whole plant. *Fig.* 1. Calyx and stamens. *Fig.* 2. Ovary, the calyx cut away. *Fig.* 3. A legume. All the figures of the size of nature.

GAYLUSSACIA URSINA, *Torr. & Gr.*

TAB. X.

G. URSINA : ramis divaricatis, junioribus ferrugineo-pilosis; foliis membranaceis deciduis ovato-oblongis acutis vel acuminatis mucronulatis viridibus puberulis subtus minute resinoso-atomiferis; racemo nutante 5–9-floro; pedicellis filiformibus bracteas caducas (inferiores foliaceas) excedentibus; corolla (viridi-rubella) globoso-campanulata; antheris vertice vix productis filamento ciliato brevioribus; fructu nigro.

Gaylussacia ursina, *Torr. & Gr. Fl. N. Amer.*, 2. *ined.*
Vaccinium ursinum, *M. A. Curtis*, *in Sill. Journ.*, 44. *p.* 82.

HAB. In sylvis montanis comit. Henderson, Haywood, Macon, etc., Carolinæ Superioris, invenerunt *Curtis, Buckley;* necnon ad summum scopulum mirabilem "Table Rock" dictum, Carolinæ Australis, ubi ipse legi. Floret Maio, Junio; fructus maturescit autumno.

Although so long overlooked by botanists, this species is very common through the mountains near the southwestern borders of North Carolina, where the fruit is known to the inhabitants by the name of *Bear-berry*, or *Bear Huckleberry*. It is doubless the plant which I find mentioned by the elder Michaux, in the manuscript diary of his travels through this region, under the name of "*Vac-*

cinium d'Ours"; but it is not described in his Flora.* The Rev. Mr. Curtis detected it, in the fruiting state, in the summer of 1839; and Mr. Buckley gathered the flowers in the spring of 1842. The next autumn I found it on the wooded summit of Table Rock in South Carolina, as well as elsewhere, and obtained living plants for cultivation in the Botanic Garden. Here it has blossomed, though sparingly, every spring, although it fails to ripen fruit. The shrub is only two or three feet high; the flowers are inconspicuous; and the fruit, though edible, and indeed not unpleasant when fully ripe (in September and October), has not the fine flavor of the other species, and is seldom eaten, except by the bears.

This plant, with the allied species, *G. resinosa*, *frondosa*, and *dumosa* (the true *Huckleberries*, as distinguished from the *Blueberries* of our markets), must be separated from Vaccinium, on account of their remarkable ten-celled ovaries, and drupaceous ten-seeded fruit. It is surprising that such an obvious peculiarity in some of our commonest summer fruits should have been so generally overlooked. Among the earlier writers, the only notices I can discover which point towards the true structure of the fruit are, that Wangenheim describes and figures his Andromeda baccata (which is Gaylussacia resinosa) as ten-seeded;† and Clayton describes another species as eight-celled, "with few osseous seeds."‡ Muhlenberg, also, in his manuscript *Florula Lancastriensis*, expressly describes Vaccinium resinosum and V. frondosum as ten-seeded. Quite recently, when elaborating the *Vaccinieæ* for De Candolle's *Prodromus*, the learned Professor Dunal noticed some fruiting specimens of one or more species with "baccis 8–10-locularibus! loculis monospermis?" But, instead of following this clew to the solution of this curious anomaly, he merely introduced a nominal species, *V. decamerocarpon*,* somewhat suspecting, indeed, that it might be a variety of V. frondosum, but unconscious that his four succeeding species shared in the peculiarity.

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* This manuscript journal was presented, by the younger Michaux, to the American Philosophical Society, Philadelphia, where it is preserved.

† *Anpflanzung Nordamericanischer Holzarten*, p. 111, t. 30, f. 69.

‡ *Flora Virginica*, ed. 2, p. 59.

The next notice, expressly stating that this character is common to all the resinous-dotted species, and that the fruit is drupaceous instead of baccate, was published by myself in January, 1842, and the name of *Decachæna* was proposed for the group or genus.† In 1843, Mr. Nuttall established the same genus on the same species, under the somewhat similar name of *Decamerium*. ‡ About the same time, on revising the Vaccinieæ for the *Flora of North America*, I was convinced that these plants are not generically distinguishable from *Gaylussacia*, and therefore referred them to that genus, from which they appear to differ in nothing but their deciduous foliage, — a character that will surely be deemed unimportant, while both deciduous and evergreen species are embraced in Vaccinium. In inflorescence, and in other respects, they quite accord with genuine species of Gaylussacia, and also in the resinous atoms with which they are more or less copiously sprinkled, but which are not found in any true Vaccinium. §

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* "An genus distinctum? An Gaylussaciæ sp. foliis caducis? An var. decemlocularis V. frondosi?" *Dunal*, *in DC. Prodr.*, Vol. VII., p. 566.

† *Botanical Excursion to Mount. N. Car.*, in *Sill. Journ.*, Vol. XLII., p. 43; reprinted in Hooker's *Lond. Journ. Bot.*, Vol. III., p. 234 (in a note). The seeds were erroneously said to be *ascending*, instead of *suspended.*

‡ *Transactions of the American Philosophical Society*, Part 3d of Vol. VIII., New Series (1843), p. 259.

§ Although Mr. Nuttall (in *Trans. Amer. Phil. Soc.*, *l. c.*) remarks, that the habit of his *Decamerium*, as well as the geographical range, "is wholly different from

In the note already referred to,* I spoke of the fruit of these plants as if really decacarpellary (which is probably not the case); for, although I then stated that several of the more common true Vaccinia "exhibit a more or less completely 8–10-celled ovary, but with many ovules in each cell," yet I was not aware, until afterwards, of the mode in which the proper cells of the ovary are divided by a spurious partition, nor, indeed, has any account of it yet been published. The peculiarity in question, which was first shown to me in Vaccinium corymbosum by Mr. Sullivant, and afterwards by Dr. Torrey, in V. stamineum, — and which may be held to explain the increased number of cells in Gaylussacia, — is, that a projection of the back, or midrib, of each carpel extends into the cell until it meets (and sometimes coheres with) the corresponding placenta projecting from the axis, so as to divide each cell into two. This is represented in Tab. X., Fig. 6, as seen in Vaccinium corymbosum. A similar case has recently been brought to light, by Mr. Bentham, in *Nelitris* and some other baccate Myrtaceæ.†

This character may be turned to good account in reducing the Vaccinia to natural sections or subgenera.‡

Gaylussacia," yet, on the same page, one of his species is justly characterized as having "something of the habit of a Gaylussacia."

* *Bot. Excurs.*, &c., in *Sill. Journ.*, *l. c.*, Jan., 1842.

† *London Journal of Botany*, Vol. II., 1843, p. 221.

‡ The North American species may be disposed under the following sections: —

VACCINIUM, *Linn.*

§ 1. OXYCOCCUS. Ovarium 4-loculare, septis spuriis nullis. Corolla 4-partita, lobis elongatis revolutis. Antheræ exaristatæ: filamenta pilosa. — Flores solitarii axillares, vel in racemis fasciculisve terminalibus; pedunculis filiformibus.

* Foliis deciduis, caule erecto, baccis insipidis. — V. erythrocarpum, *Michx.*

** Foliis persistentibus, caulibus prostratis, baccis acidis. — V. Oxycoccus, *L.* V. macrocarpon, *Ait.*

It may be here mentioned that the flowers of *Gaylussacia resinosa* and *G. frondosa* are subject to a frequent monstrosity, in which the calyx and corolla become free from the ovary, somewhat fleshy, and enlarged to eight or ten times their natural size; the stamens being also thickened, misshapen, and imperfect. Of the same nature are the fleshy bodies borne by Azalea viscosa and

§ 2. VITIS-IDÆA. Ovarium 4–5-loculare, septis spuriis nullis. Corolla cylindrico- vel globoso-campanulata, 4–5-dentata seu 4-loba. Antheræ exaristatæ: filamenta pilosa. — Flores in racemis brevibus, bracteati et bibracteolati; foliis persistentibus. — (Vaccinii et Metagoniæ pars, *Nutt.*) V. Vitis-Idæa, *L.* V. myrtifolium, *Michx.* (V. crassifolium, *Andr.*) V. ovatum, *Pursh.*

§ 3. BATODENDRON. Ovarium pseudo-10-loculare. Baccæ (vix edulis) loculi abortu oligospermi. Corolla patenti-campanulata, 5-loba. Antheræ dorso 2-aristatæ: filamenta pilosa. — Flores in axillis foliorum ramealium solitarii, quasi racemosi, pedunculis filiformibus ebracteolatis.

* Foliis sempervirentibus, antheris inclusis, baccis nigris. — V. arboreum, *Marsh.* (V. diffusum, *Ait.*) (*Gen.* Batodendron, *Nutt.*)

** Foliis pallidis deciduis, antheris exsertis, baccis albidis. — V. stamineum, *L.* (V. elevatum, *Soland.*) (*Gen.* Picrococcus, *Nutt.*)

§ 4. EUVACCINIUM seu MYRTILLUS. Ovarium 5- rarius 4-loculare, septis spuriis nullis. Corolla subglobosa vel urceolata, 5–4-dentata. Antheræ dorso 2-aristatæ: filamenta glabra. — Boreali-alpinæ; foliis deciduis.

* Flores (sæpissime decandri) in axillis foliorum solitarii. — V. Myrtillus, *L.* V. Chamissonis, *Bong.* V. salicinum, *Cham.* V. myrtilloides, *Michx.* V. parvifolium, *Smith.* V. ovalifolium, *Smith.* V. cæspitosum, *Michx.*

** Flores (sæpius octandri) 2–4-nati e gemmis propriis. — V. uliginosum, *L.*

§ 5. CYANOCOCCUS (id est *Blueberry*). Ovarium pl. m. pseudo-10-loculare. Baccæ (dulces) pleiospermæ. Corolla cylindracea vel urceolata. Antheræ exaristatæ: filamenta pilosa. — Americanæ; fasciculis florum, vel racemis brevissimis, e gemmis squamosis propriis.

* Foliis sempervirentibus. — V. Myrsinites, *Lam.* (V. nitidum, *Andr.*)

** Foliis deciduis. — V. corymbosum, *L.*, cum spec. cognatis, vulgo *Blueberries.*

A. nudiflora, popularly known under the name of "*Swamp Apples*." These are altered flower-buds, which, possibly on account of the puncture of insects (though of this I have seen no proof), develope in the form of solid succulent excrescences, half an inch to an inch in diameter, of irregular shape, but in which at first all the parts of the flower, though misshapen and obese, can often be distinguished. They obtain their full size at midsummer, when they have a not unpleasant acid flavor, and are greedily eaten by boys.

Since the foregoing account was prepared for the press, I have fortunately detected a true evergreen species of Gaylussacia, indigenous to the United States. The plant I refer to is the extremely rare *Vaccinium buxifolium* of Salisbury, the *V. brachycerum* of Michaux, which I have in vain sought for in the mountains of Virginia, but which has lately been discovered in Pennsylvania (in Perry county, near Bloomfield), by Professor Baird, of Dickenson College. From the specimens which this accomplished naturalist has obligingly sent me, I find that it has a ten-celled ovary, with a solitary ovule in each cell, instead of presenting the structure of the section *Vitis-Idæa*, with which the plant agrees in habit; and the fruit is evidently a ten-pyrenous drupe.*

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* *Gaylussacia brachycera:* humilis, glaberrima; ramis angulatis; foliis (Buxi) ovalibus crenato-serrulatis; racemis subsessilibus glomeratis; pedicellis 2-bracteolatis brevissimis; corolla (rubro tincta) breviter campanulato-cylindracea; antheris in tubulos vix productis filamento ciliato brevioribus. — Vaccinium buxifolium, *Salisb. Parad. Lond.*, t. 4; *Bot. Mag.*, t. 928; *Bot. Cab.*, t. 648. V. brachycerum, *Michx. Fl.* 1, p. 234.

The habitat given in the Flora of Michaux is, "In Virginia, circa Winchester"; but the specimen in his proper herbarium at the *Jardin des Plantes* is marked "*Warm Springs*." There are specimens in the herbarium of Muhlenberg, ticketed "Vaccinium Poxafolia, *Krien Preyer*," in the unmistakable chirography and orthography of Matthew Kin; from which I infer that this collector found the plant in

TAB. X. *Gaylussacia ursina ;* flowering branch of the natural size. *Fig.* 1. Lateral view of a magnified stamen. *Fig.* 2. The same, seen from within. *Fig.* 3. Fructified ovary magnified, with a cross-section showing the ten uniovulate cells. (The dots are resinous atoms.) *Fig.* 4. A detached pyrena of the fruit. *Fig.* 5. Section of the same, showing the seed. *Fig.* 6. Magnified transverse section of an ovary of *Vaccinium corymbosum.*

⁂ It may not be improper here to introduce a remark respecting certain dubious Ericaceous genera which appear to border on Aquifoliaceæ, namely, *Cyrilla*, *Cliftonia*, &c. Cyrilla was placed by Jussieu in his Ericeæ, and Cliftonia was referred to the same family by Sprengel. Lindley,[*] however, in 1836, referred them to the order Celastraceæ, with which they have little or no agreement, except in habit. In 1838, it was suggested, in the *Flora of North America*, that these genera, along with Elliottia, should constitute a suborder, CYRILLEÆ, of the great family Ericaceæ, characterized by a polypetalous corolla, inappendiculate anthers opening longitudinally, and uniovulate cells of the ovary.[†] Endlicher, who had omitted Cyrilla and Cliftonia from the body of his *Genera Plantarum*, afterwards appended them to Ericaceæ in his first Supplement ; but subsequently, with much acuteness, joined the group Cyrilleæ to the order Ilicineæ, from which he considers them to differ only in the insertion of the petals and stamens (from the absence of a disk) upon the receptacle, and in having a larger embryo.[‡] Recently, Dr. Lindley has raised the Cyrillaceæ to the rank of an independent order, which he places next to Olacaceæ in his most discordant alliance Berberales ;[§] distin-

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Greenbrier county, Virginia. From this source, the fragment in the Willdenovian herbarium, communicated by Muhlenberg under the name of "Vaccinium coriaceum," was doubtless derived.

[*] *Introd. to Nat. Syst.*, ed. 2, p. 119.

[†] Torrey & Gray, *Flora N. Amer.*, Vol. I., p. 256 ; note under Celastraceæ.

[‡] *Enchiridion Botanicum*, 1841, p. 578.

[§] *Vegetable Kingdom*, 1846, pp. 432, 445.

guishing them, and indeed his whole alliance, from the Ericaceous group by a sole diagnostic character (the anisomerous cells of the ovary) which would not only exclude one of his genera, namely, Elliottia, but also embrace Clethra, Loiseleuria, Leiophyllum, &c. During the present year, M. Planchon has reëstablished the group as one of the primary divisions of Ericaceæ, with the diagnostic character of "Ericeæ petalis liberis, antheris inappendiculatis, fructu indehiscente (an semper ?), loculis monospermis," adding a new genus, *Purdiœa*, which, with the habit and much of the structure of Cliftonia, has a slender style, and anthers opening by terminal pores.*

The discovery of this interesting genus thus appears to prove that Cyrilla and Cliftonia were rightly referred to Ericaceæ ; although, on the other hand, Cliftonia is scarcely to be distinguished from the order Aquifoliaceæ except by the want of an hypogynous disk, the double number of stamens, the dry, instead of drupaceous, fruit, and the slender embryo. But Cyrilla further differs in another particular, which it is the principal object of this note to record. The seeds are indeed solitary, but the ovules are about three in each cell ; as is well shown in some analyses kindly made for me, in the spring of 1839, by M. Decaisne. I also find, on reëxamination with better specimens, that the ovary of Elliottia bears several (6 – 10) ovules in each cell, which are so small and so closely packed together on the short pendulous placenta, that they were mistaken for a single ovulum. The fruit is still a desideratum ; but, from the appearance of the ovary, I suspect it will prove to be capsular and septicidal ; so that, for the present, the genus should perhaps be placed next to Bejaria.

CORRECTION. The name of COREMA CONRADII has already been taken up by Dr. Torrey for the plant described in the first article of this memoir, in a letter to the late Mr. Loudon, cited in the *Gardener's Magazine*, Vol. XVII. ; and it is employed in Loudon's *Arboretum and Fruticetum Abridged*, p. 1092.

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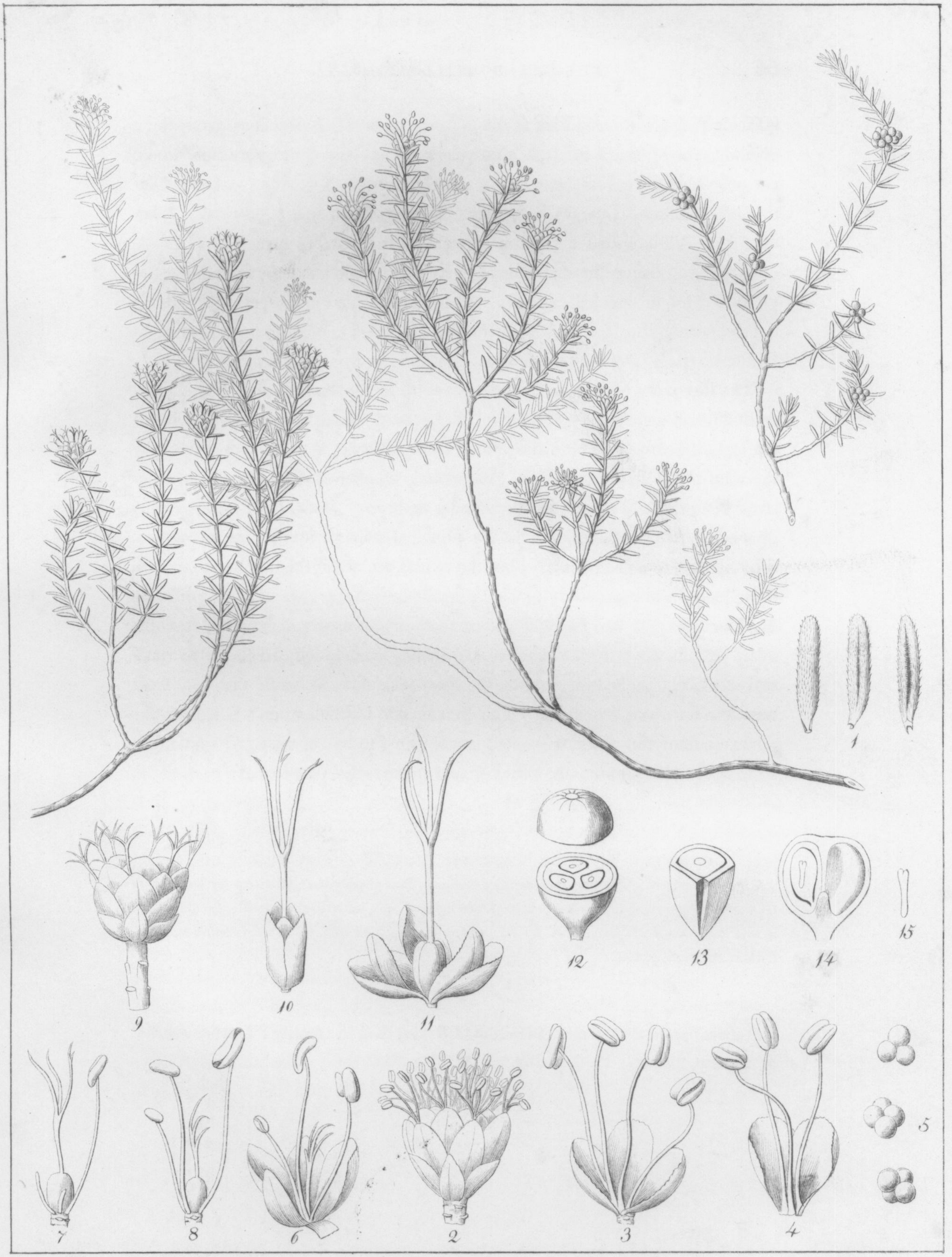
* *Description d'un Genre voisin du Cliftonia*, &c., in Hooker's *London Journal of Botany*, for May, 1846, p. 250, tab. 9.

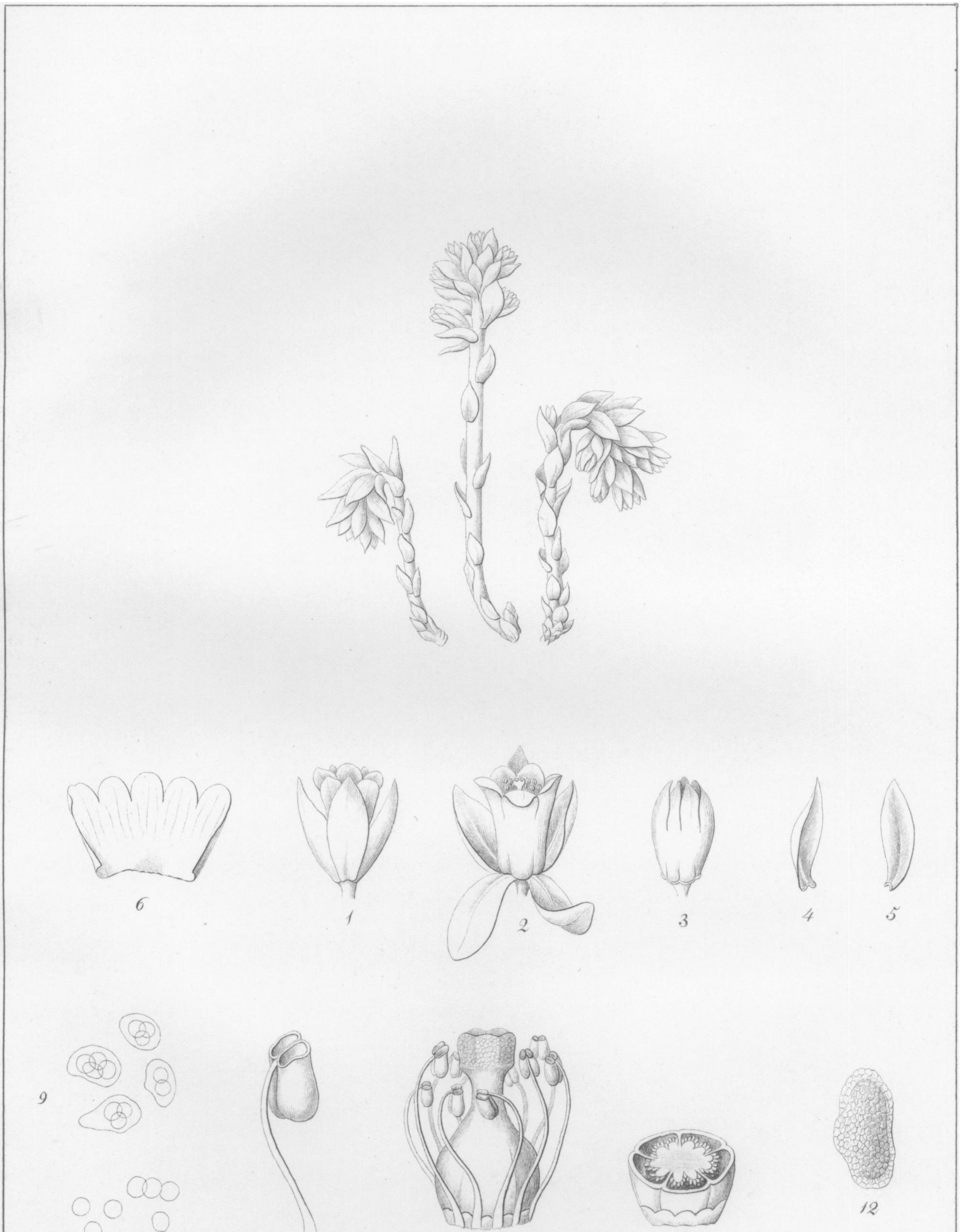
Tab. 1.



Sprague omnes del.   Prestele omnes in lap. fc.   Hall & Mooney exc.

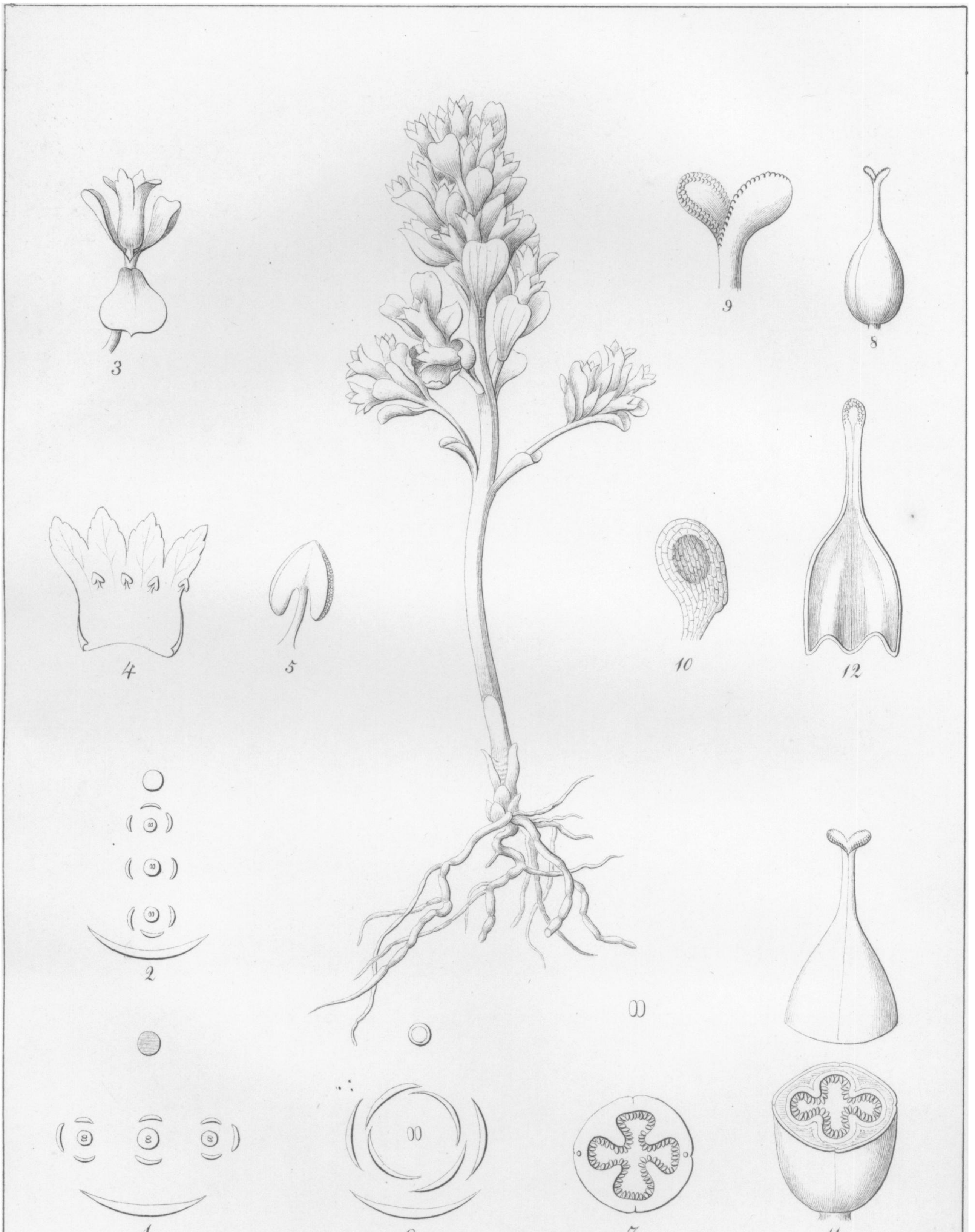
Oakesia Conradii.

Tab. 2.

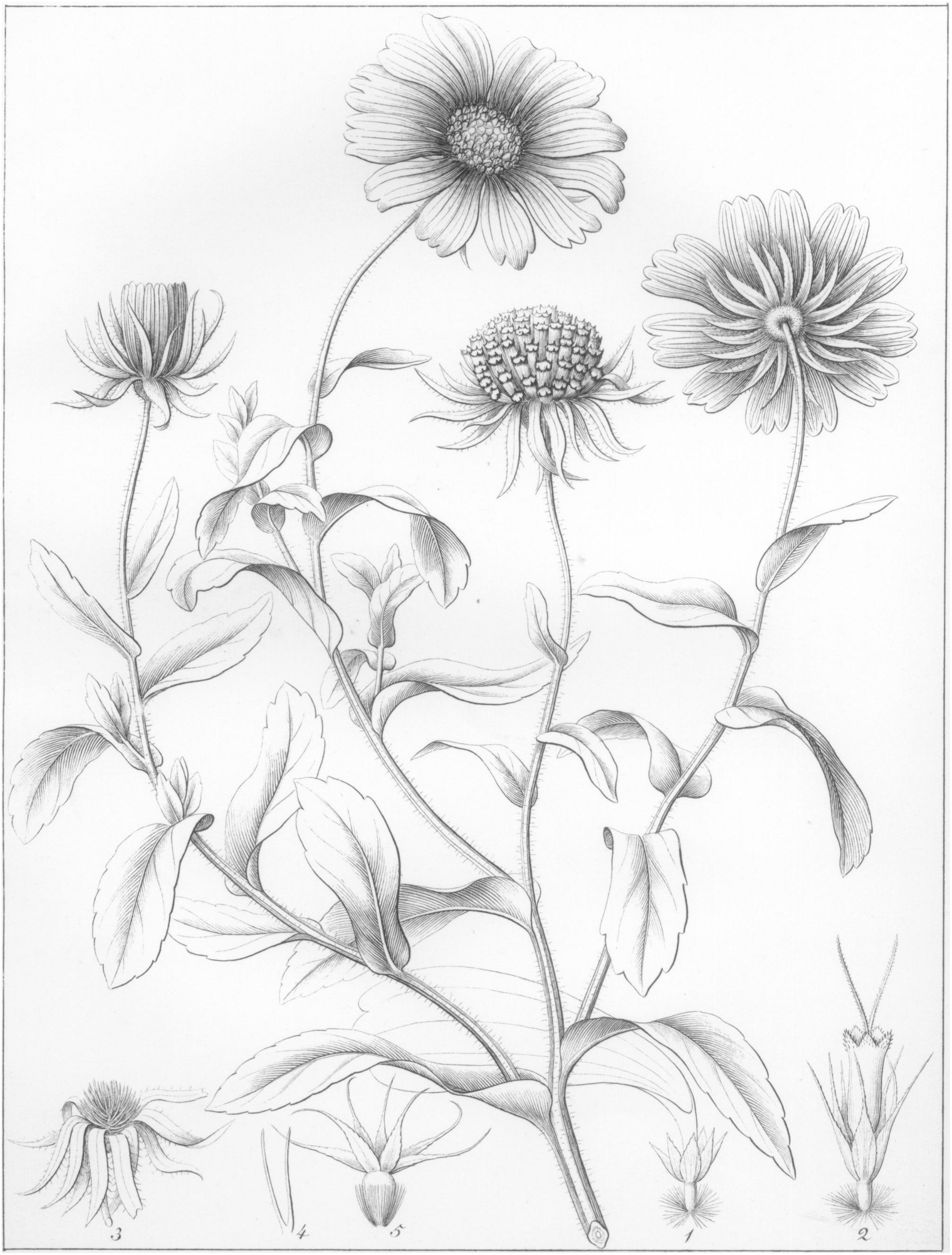


Schweinitzia odorata.

Tab. 3.

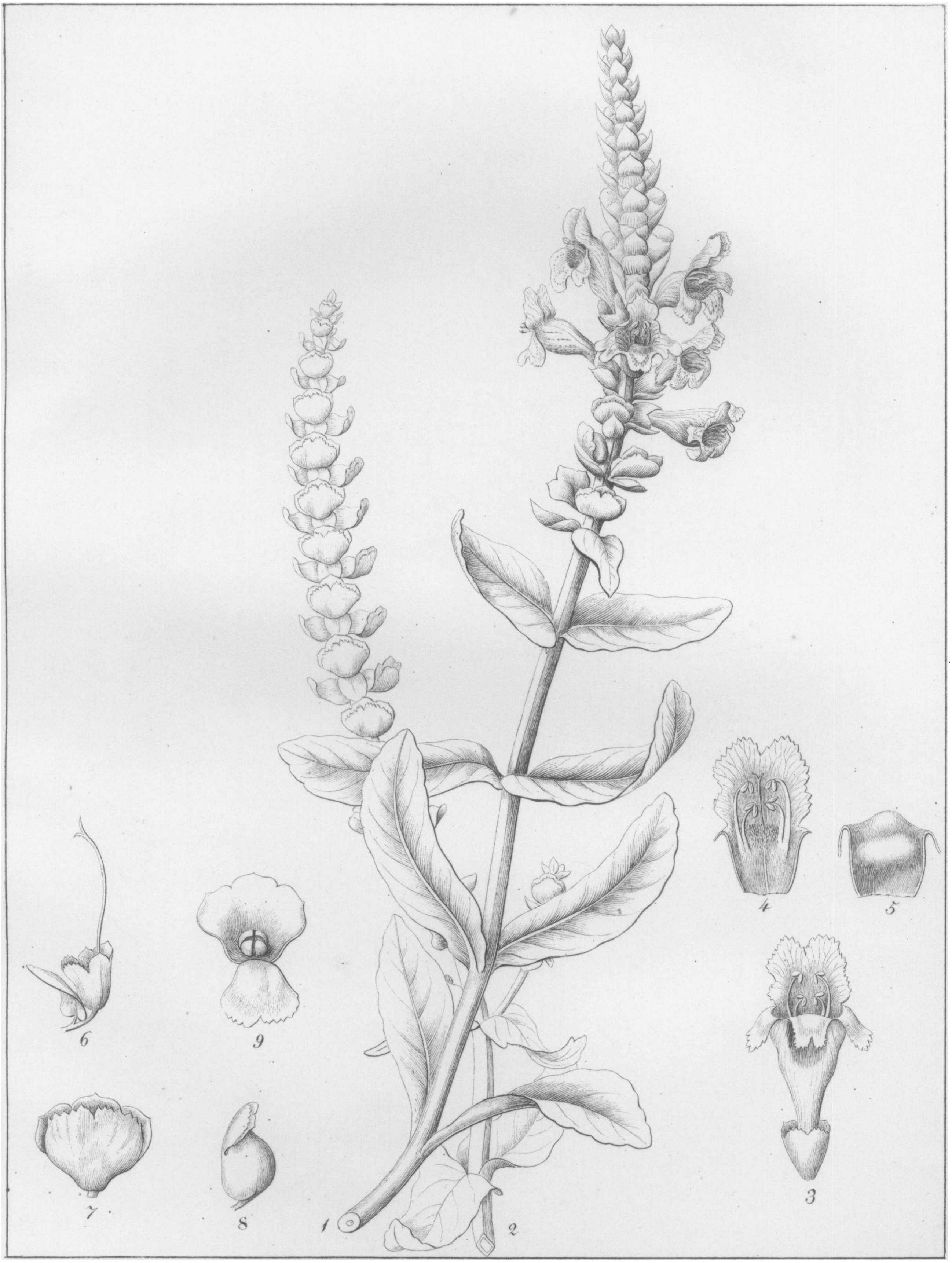


Obolaria Virginica.

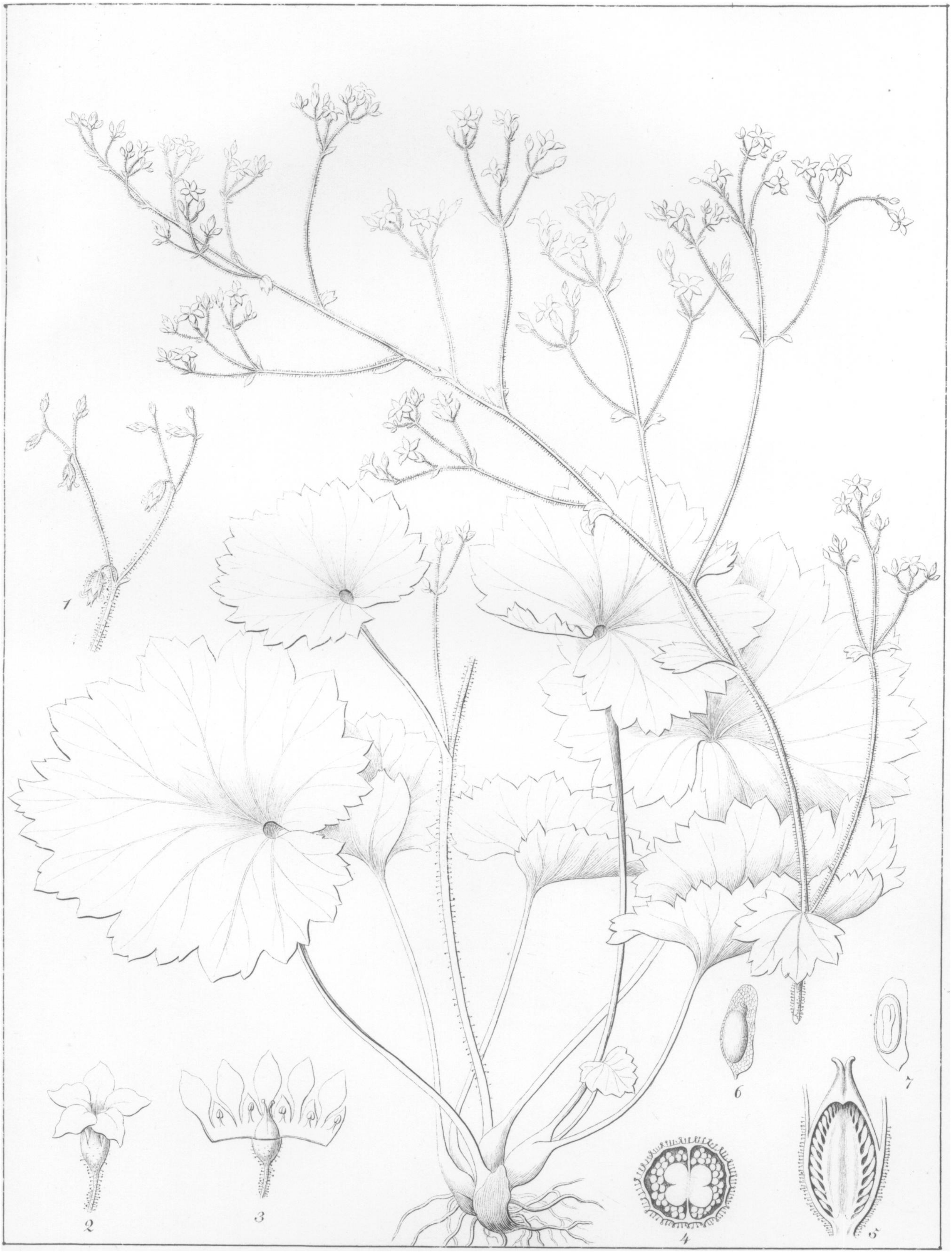


Gaillardia amblyodon.

Tab. 5.

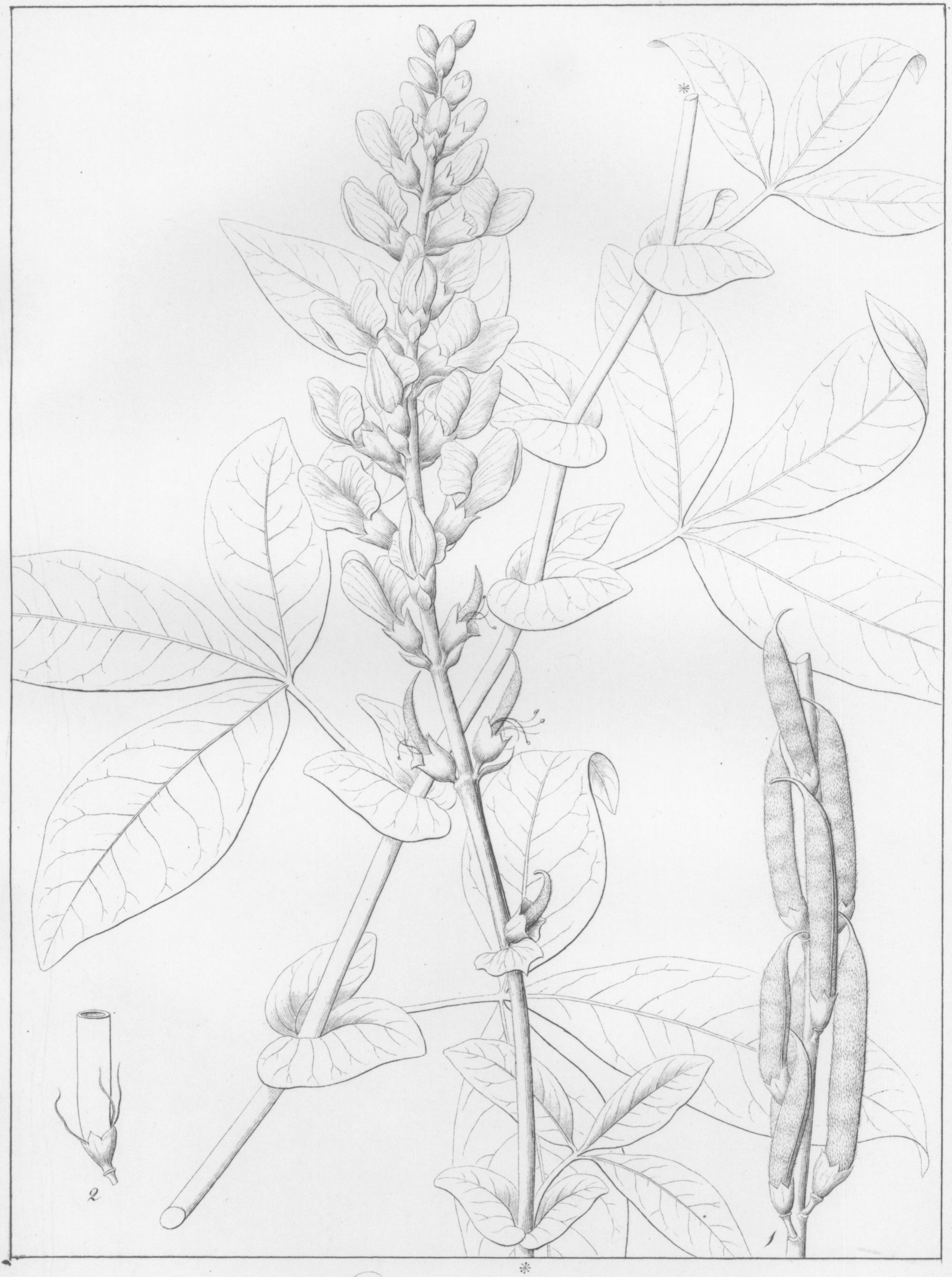


Brazoria truncata.

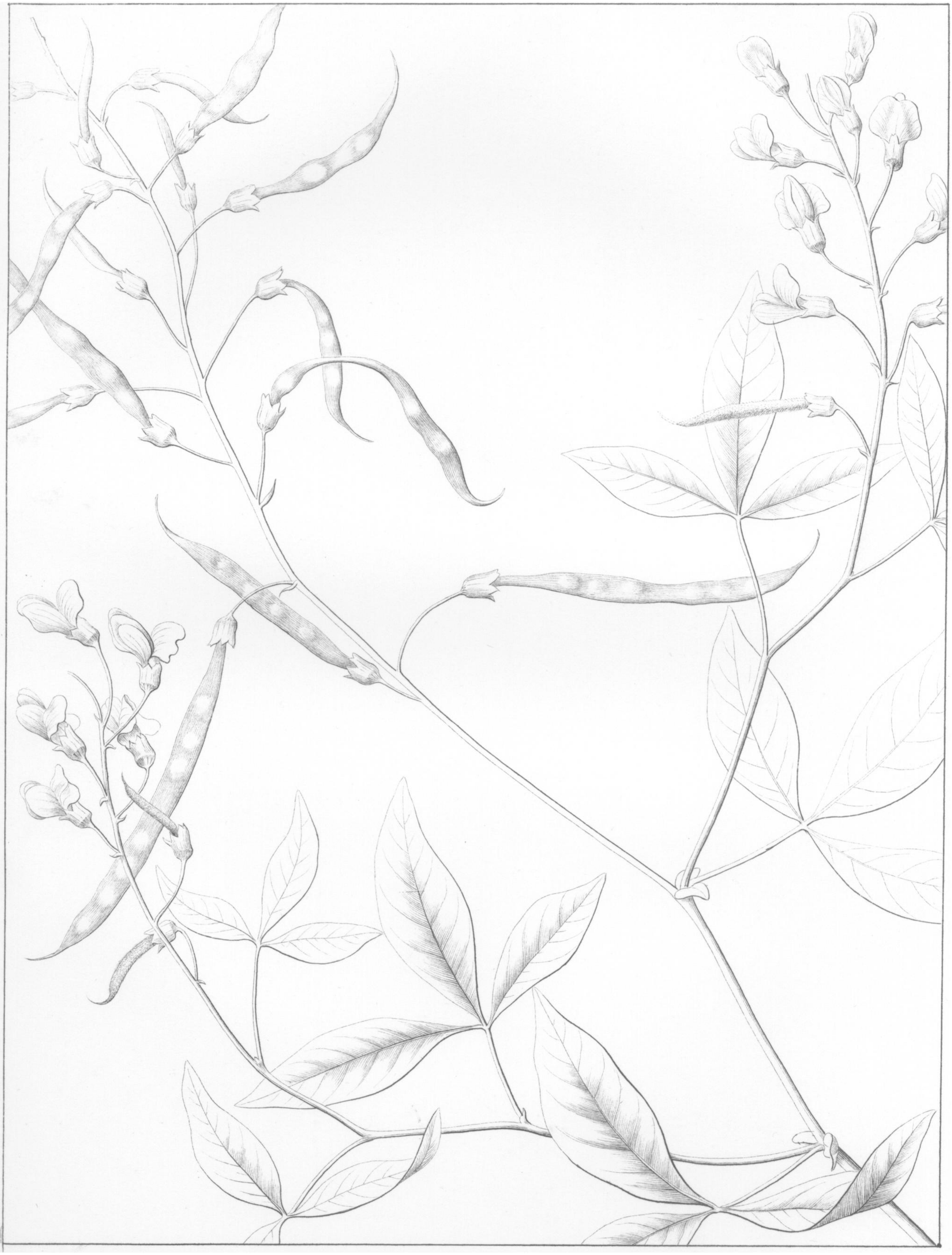


Sullivantia Ohionis.

Tab. 7.

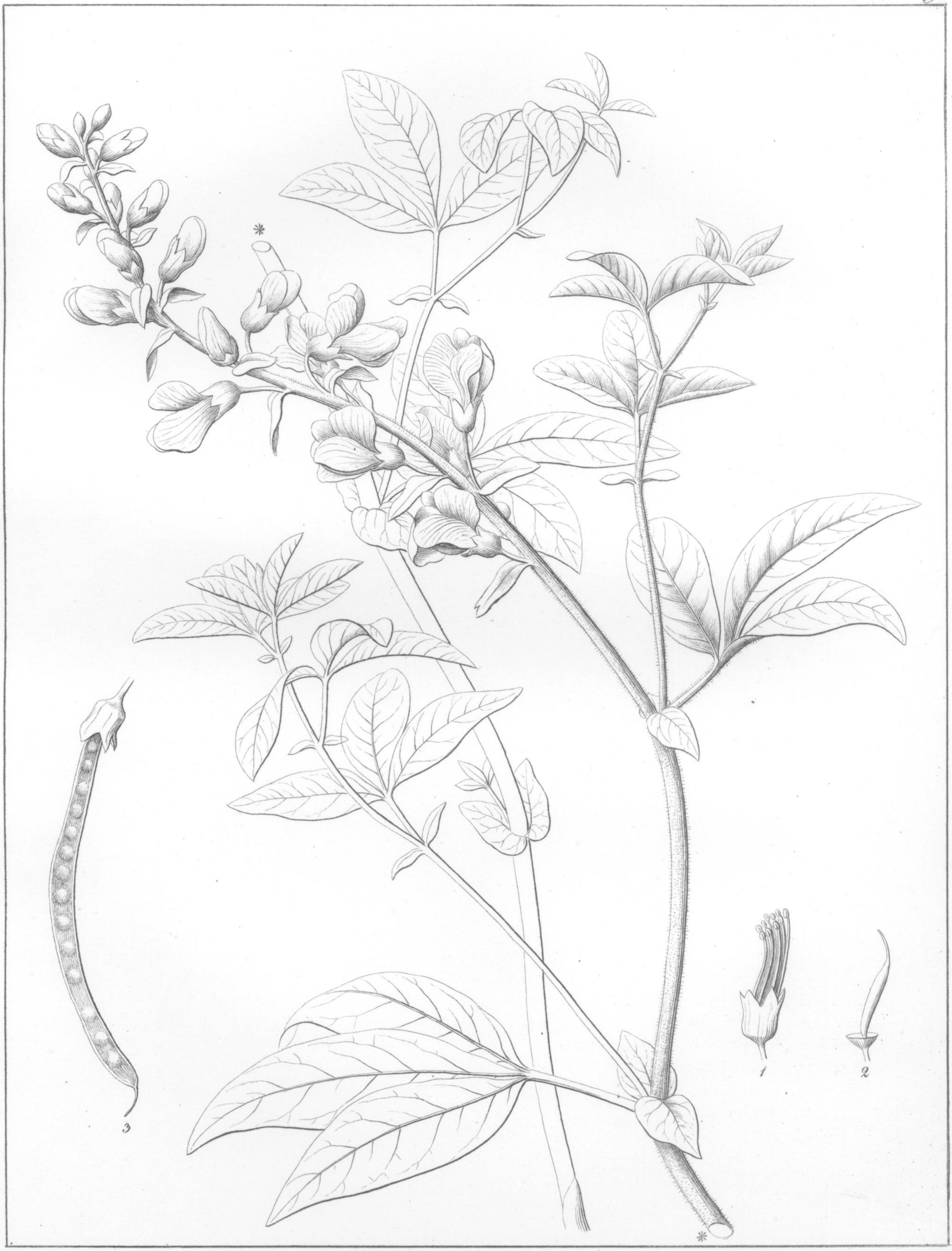


Thermopsis caroliniana.



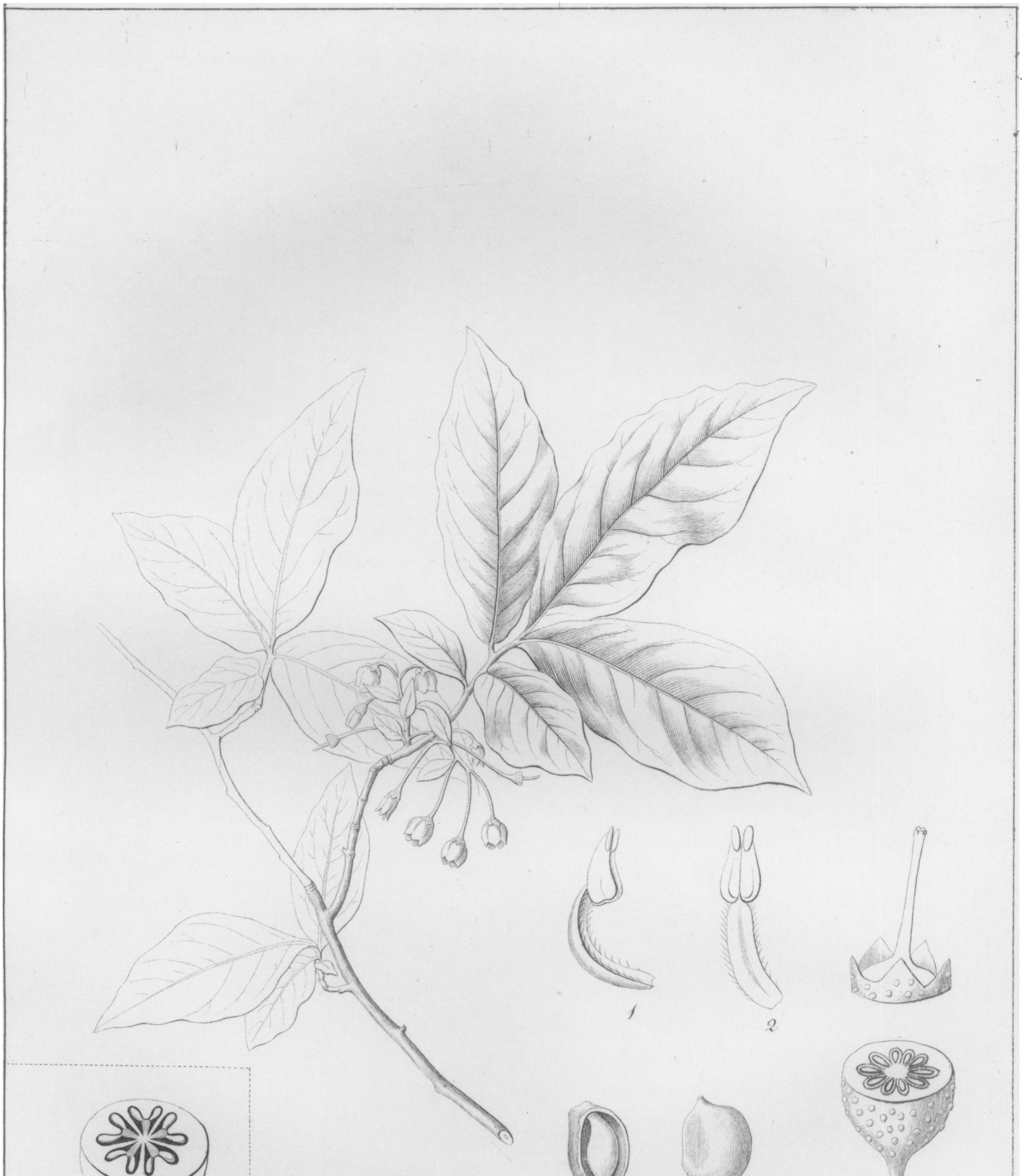
Thermopsis fraxinifolia.

Tab. 9.



Thermopsis mollis.

Tab. 10.



Gaylussacia ursina.